QST

july, 1943
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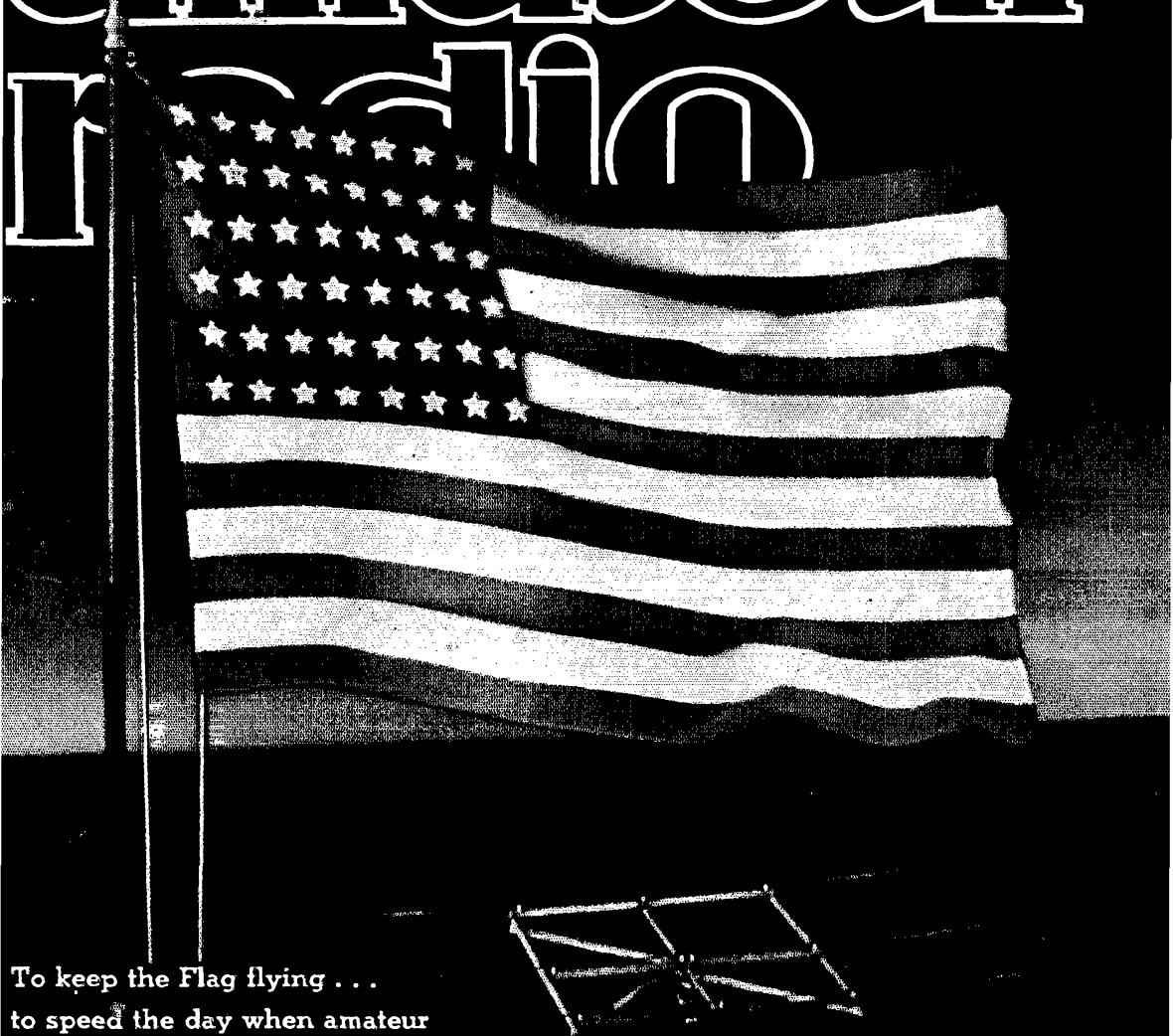

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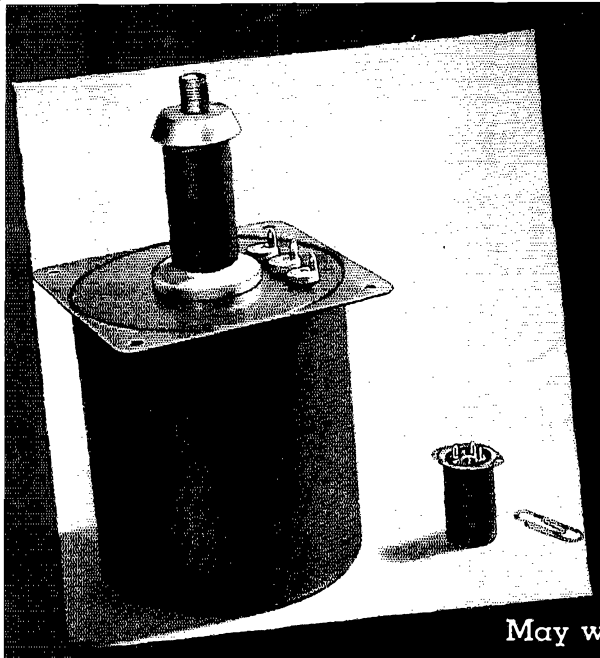

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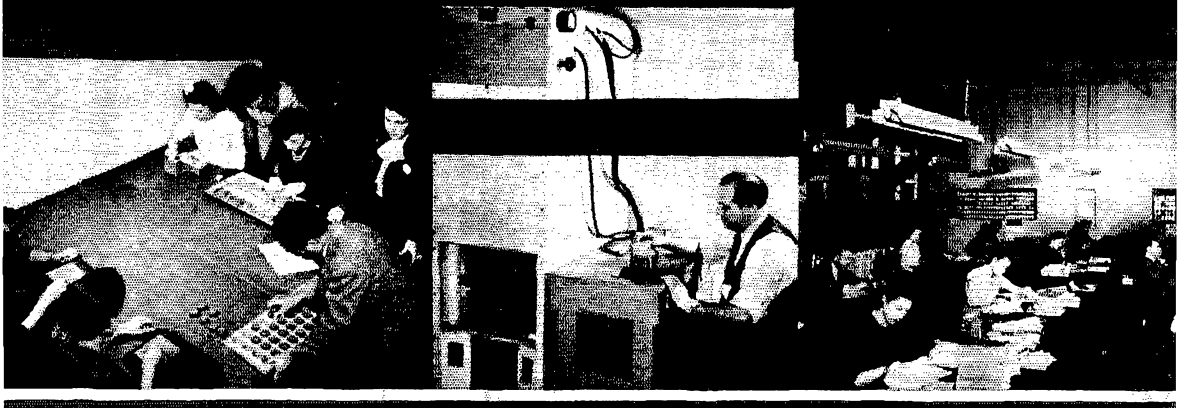

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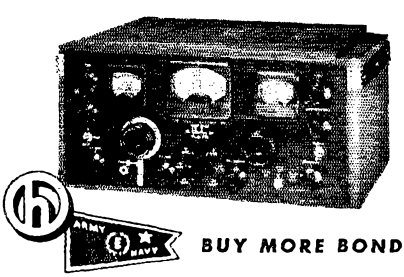
Pardon me, I've got work to do now. When the war's over look me up—on the front porch.



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JULY 1943

VOLUME XXVII

NUMBER 7

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QST *devoted entirely to*

AMATEUR RADIO

PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN; BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.: OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

CONTENTS

Section Communications Managers of the A.R.R.L. Communications Department

Reports Invited. All amateurs, especially League members, are invited to report communications activities, training plans, code classes, theory-discussion groups, civilian-defense building or planning each mid-month (16th of the month for the last 30 days) direct to the SCM, the administrative official of ARRL elected by members in each Section whose address is given below. Radio Club reports and Emergency Coördinator reports representing community organized work and plans and progress are especially desired by SCMs for inclusion in *QST*. **ARRL Field Organization appointments**, with the exception of the Emergency Coördinator and Emergency Corps posts, are suspended for the present and no new appointments or cancellations, with the exception named, will be made. This is to permit full efforts of all in Emergency Corps plans.

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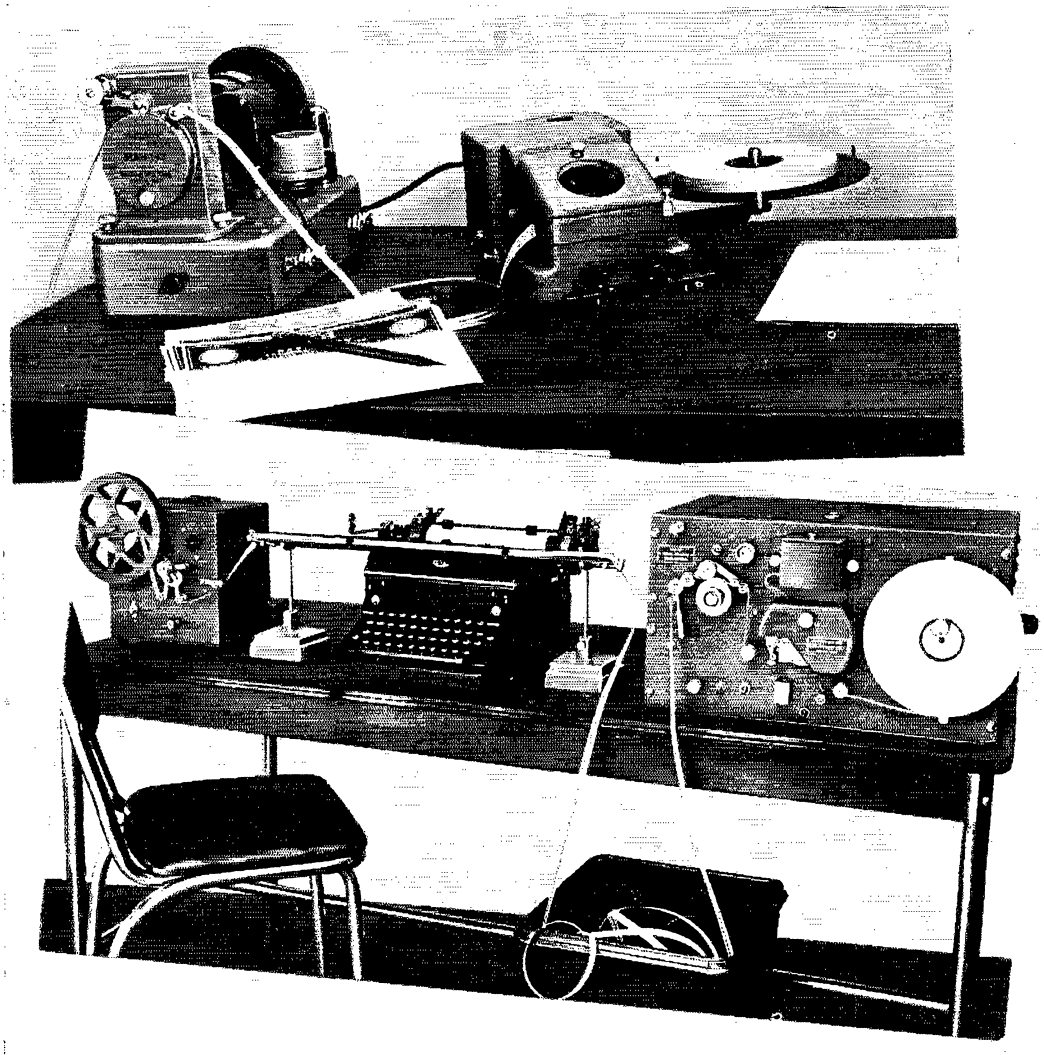

High-Speed Automatic Radiotelegraph Assemblies

These two photographs illustrate a complete automatic transmitting assembly (upper photograph) and an automatic receiving assembly (lower photograph). Installations of this type are typical of the high-speed radio telegraph equipment employed by such international commercial companies as R.C.A. Communications, Mackay Radio, Globe Wireless, Press Wireless . . . and military services everywhere.

The McElroy Manufacturing Corporation is the largest organization in the world devoted exclusively to the design and production of equipment for the transmission and reception of dots and dashes.

As creative telegraphic engineers, we are leaders in our field. We create. We design. We build. We do not imitate and we do not copy. And we can deliver. Our corps of experienced engineers and craftsmen are at your disposal.

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THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the Secretary at the administrative headquarters at West Hartford, Connecticut.

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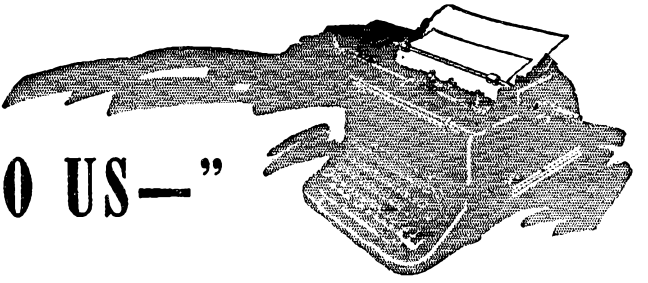


"IT SEEMS TO US—"

CONGRATULATIONS, SON

TO YOU soldiers and sailors who have just sent and received your first actual radio message, our congratulations. When you did that, a new radio operator was born.

Now you have tasted the mastery that goes with radio. You see more clearly that this earth is but a tiny sphere, and you know that the radio operator holds its intelligence in his hand and mind, its utmost distance no more than a fourteenth of a second away.

You are more than a young fellow fiddling with a technical subject. You have work to do, to help get this war won — a war in which every move by every unit is first dependent upon the skillful handling of communications. Soon your training will be completed and you'll move to a battle front — afloat, on the land or in the sky. You are eager to get going, because what you have to do there is of superlative importance and you know it. You know the magnificent record of the radio operator, you know that the message *must* get through, and you are resolved to uphold those high traditions. Because you have had the benefit of good training, and because you are an American with a job to do, we know that you will do those things well and that you'll write a new chapter in the rich history of radio.

When this war is over and you come home again, you're not going to forget about radio. There is something chronic about that radio bug; it gets under your skin and there seems to be nothing that will permanently neutralize it. It will be a part of your life, that ability to exchange thoughts in a twinkling regardless of the distance. Thousands of pre-war radio amateurs now feel the same way — the very men who, in fact, are in large measure responsible for creating the kind of gear with which you work. When the peace is won, these men will be back on the air as amateurs. You'll probably want to become a radio amateur, too, with your own station and the right to tinker circuits to your heart's content and the ability to converse with your similars everywhere. It will be one way in which you can give expression to your own ideas in radio and put to work for your own pleasure the skill that you are now acquiring. Perhaps you'll even have some time to think about that after-the-war station you're going to have. For Amateur Radio is one of the symbols of the democratic way of life and you'll find it waiting here for you when you get back.

Congratulations, son — good luck and a safe return!

K. B. W.

SABOTEURS AND SPIES LOOSE

ATTENTION, amateurs! The FBI recently announced that a new crop of highly-trained Nazi saboteurs was about to graduate from a crack Berlin saboteur school and be loosed on the world. Some of these men — and women, maybe — will be sent to the U. S. to hamper war work, undermine production, destroy factories and materials of war destined for our fighting forces overseas, upset our utilities. The intelligent, watchful coöperation of every American citizen is needed if these saboteurs' activities are to be neutralized.

Since before Pearl Harbor we have been warned of enemy activities in this country. More than 218,000 reports have been turned in to FBI and approximately 13,000 apprehensions of enemy aliens have been made. All reports are investigated, regardless of their seeming unimportance, and in many instances valuable leads are developed which uncover enemy activities on our soil.

For instance, an observant Connecticut aerial photographer, suspicious of an unusually large order for photos, informed the FBI, who identified the purchaser as an enemy spy furnishing his country with information concerning our aircraft production. A Connecticut ham, driving through the countryside, noticed a partially-concealed "amateur" array in a locality where no amateur station was known to exist; investigation disclosed that it was being operated by a Nazi sympathizer. These are but two incidents typical of dozens which have occurred in every section of the country.

FBI lays down four rules for citizen coöperation which every amateur may well take to heart. First, any individual's information may provide the essential clue in apprehending an enemy agent. Second, don't fail to report an item because you think somebody else may do so. Third, no report is too "insignificant" to be considered by FBI. Fourth, keep posted on "persons wanted," whose photos and descriptions are displayed in police stations, post offices and other public buildings.

The amateur has a double duty. His is a peculiarly important trust, not only to keep essential radio information to himself but to be everlastingly alert to spot those who would attempt to procure such information for iniquitous purposes. A natural curiosity on the part of a fellow amateur toward new radio developments is no cause for alarm, but undue interest on the part of a stranger must be viewed with suspicion. Don't go "witch hunting" — but don't go to sleep, either.

Amateurs have always been allergic to radio conversations within earshot. A chance remark overheard, a too-zealous interest in the commonplace, an inexplicable fact or occurrence — these may constitute the germ of an idea that all is not well. Many ordinary citizens have contributed by the simple process of keeping mentally awake and reporting facts which aroused their suspicions. Certainly amateurs, with their previous training in keen observation and analysis, can do that job as well or better than the general public.

If you have a sincere doubt of a situation which might imperil the national security, don't go sleuthing yourself; report the facts to the nearest FBI office and let the G-men investigate. True, it gives them more work but, by their own statement, they would rather have too many than too few reports. And, above all, don't make the mistake of assuming that any suspicious incident is too trivial — FBI records disclose that some of the most dangerous espionage rings were initially uncovered through reports of seemingly minor details by vigilant citizens. Where countless lives and invaluable production are involved, overzealousness is far better than negligence.

C. A. S.

YOUR NEW EDITOR

I REVERT to the first person long enough to make a statement on a matter very close to me.

It seems to be almost a tradition that I am the editor of *QST*. For nearly twenty-five years my name has so appeared in the masthead. An exception occurred in 1938, when the late Ross Hull brilliantly earned that right and carried the title for a few short months before his tragic death. I resumed it then. Now it has been won again.

I have named Clinton B. DeSoto editor of *QST*. As my executive assistant for editorial matters he has been doing the work for over a year, and doing it superlatively well. Let him have the credit. It puts no strain on your imagination to realize that these days it takes a great deal of running at Headquarters to stay in the same place. What with Bud and John off to the wars and Charlie and me overloaded with war-aid matters and wartime League problems, things have long since reached the point where I'm no more this magazine's editor than I am its grandmother. Clint, with the able help of Lou and the sound advice of George and Don, does the work, and I believe in giving him the kudos and letting the world know that he's the one.

It isn't as if Clint DeSoto were a new and untried factor in our lives. He was an assistant secretary of the League for twelve years before taking over editorial matters early last year. He knows the League backward and forward, has traveled the country over as a speaker at conventions and club meetings. His innumerable *QST* articles witness that he is both a good technician and an unusually competent journalist, particularly his special articles on the wartime radio training establishments. He is the author of several books, including our own *Two Hundred Meters and Down*, the history of the amateur movement. The issues of *QST* he has turned out in the past year are proof enough of his editorial and administrative abilities.

I have had occasion before to remark that, of all my ARRL work, *QST* is my first and greatest love. It always will be. I am retaining a place for myself in its picture, under the title of general manager of ARRL publications. It will still be my duty to act as the liaison between the Board of Directors and the editorial staff, to see that *QST* continues to be of the maximum utility in advancing the policies of the League and in assisting its members in their problems. And on this page, which is a sort of Secretary's page anyhow, I shall continue to see you and to sign myself

K. B. W.

★ SPLATTER ★

GBA, PSE

TO FACILITATE prompt mail delivery despite its reduced personnel, the Post Office Department on May 4th announced a zoning system to be put into effect in 178 of the larger cities which will eliminate multiple sorting of mail in railway post offices and terminals.

Under this system each city is to be divided into numbered zones. These zone numbers will then form part of the mailing address. For example, note that ARRL Director E. Ray Arledge's address (p. 6) now reads, "Miami 37, Fla." Miami happens to be one of the first cities to have put this new zoning system into effect, and W5SI happens to live in Miami's zone 37, so he has added that numeral following the name of the city.

If you live in a city of 50,000 or more population, inquire at your post office if and when this

(*Continued on page 41*)

QST Visits Camp Hood

Radio in the Tank Destroyers

BY CLINTON B. DESOTO,* WICBD

THERE'S a new kind of American soldier in this war. Newer than the paratroopers or the commandos, he is a combination of infantry and artillery, armored force and mechanized cavalry. Newer than the blitzkreig, he was evolved in answer to the panzer attack. New as U. S. participation in this war, two years ago he was first conceived as the nebulous answer to an unsolved problem, a year ago first went into training.

He is a TD — a member of the Tank Destroyers, the latest arm in the arsenal of modern warfare. Everything about the TDs is new and different — their purpose, functions, technique, organization. New and different, too, are their weapons, small and large, and their methods of communication — including their training of radio operators and technicians.

So new are the Tank Destroyers, in fact, that many American citizens still don't quite know what they are or how they accomplish the purpose implicit in their name.

Up to a point the name of the Tank Destroyers is self-explanatory. The trouble is that it is the name both of a principle of warfare as well as of individual weapons and soldiers. You've heard the massive armored vehicle with its heavy 3-inch anti-tank gun at left in the photograph below called a "tank destroyer." It is — but so also are the foot soldiers on the right. Each is a single unit in an elaborate organization — the tank destroyer battalion — created for the specific purpose of defense-by-attack against the shattering spearhead of armored might.

The Tank Destroyers represent a new philosophy in warfare — the combination into one group of those military elements whose objective it is to stop the enemy's tanks and break up his offensive or render it ineffectual.

But don't be misled. The TDs are not a defensive arm — except to the extent that a boxer feinting for an opening is on the defensive.

That isn't clear? A capsule lesson in kindergarten tactics may help. First of all, historically, wars are waged not primarily to fight battles but to win booty and territory. In theory it is not supposed to be the soldier's job to kill another soldier; his job is to overwhelm the civilian population. Unfortunately for theory, of course, the civilian population in turn sometimes constitutes itself an opposing army and fights back.

If the opposition develops into anything like parity a stalemate results, and, as far as the aggressor is concerned, he is defeated — he cannot now achieve his objective of conquest. Of course, he'll continue fighting to keep from being conquered himself, but that's only incidental to the theory involved. The point is that, to win a victory, one side or the other must establish superiority.

It follows that the correct use of an army is not to fight another army on equal terms but to annihilate weaker forces. And when opposing forces become numerically similar, some other means of establishing superiority must be found.

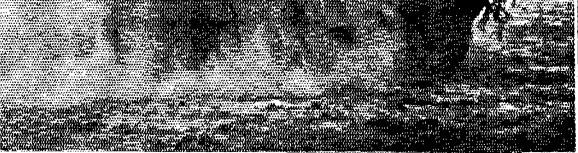
The historic way of achieving such superiority is by inventing superior weapons — the slingshot vs. the hurled stone, the arquebus vs. the long bow, the repeating rifle vs. the musket, the tank vs. the machine gun.

That's how the armored tank came to be invented. It provided a means of killing the enemy's soldiers in relative security, its occupants protected against their fire and equipped with heavier armament. The tank became the superior weapon that supplied the margin of strength required for victory — at least until the other side also began to use tanks. Then parity was once more restored.

But remember — parity is a violation of the

*Editor, *QST*.

Tankbusters in action. *Left* — M-10 tank destroyer. *Right* — Pioneers with Molotov cocktails and grenades.
Official U. S. Army Signal Corps—Camp Hood Photographs



basic principle of war. When soldiers fight other soldiers on equal terms or tanks fight other tanks, it's bad military practice. You fight a rifle with a machine gun, a machine gun with a tank, a tank with a —

Ah, with what? That is — or was — the question. Until the advent of the tank destroyer, the only answer (except for field artillery, which demonstrably was at a disadvantage) was another tank. That's the way the Russians stopped the German blitzkreig — at the outset. The trouble with this system is that you might stop the enemy's tanks but you'd probably use up all your own in doing so — and then you'd have none left for the counterattack you must make to clean up the rest of the enemy's army and establish victory.

The need for an effective anti-tank arm became clear early in the present war, but the solution was not so clear. It took a brilliant and aggressive lieutenant colonel named Bruce — now Major-Gen. A. D. Bruce, commanding officer of the Tank Destroyer Center at Camp Hood — to figure out the answer and drive it through to adoption.

That answer was the Tank Destroyers — an integrated aggregation of specialist vehicles, weapons and men, built around a key weapon consisting of a heavy anti-tank gun mounted on a lightly-armored vehicle with much greater speed and agility than the heavily-armored tanks — a weapon which could be built at lower cost than a tank.

But the tank destroyer is not just a heavy mobile anti-tank gun. True, there is a weapon of that name, but it is only one of many used by the Tank Destroyers. Every method known capable of smashing tanks is employed, from the high-velocity shells of self-propelled 3-inch guns and the massed channeling fire of an ambushing battery of flat-trajectory 3-inch guns to the guerrilla-like tactics of tank hunters armed with sticky grenades and Molotov cocktails.

Included is the TDs' latest weapon — the "bazooka," until recently a carefully-guarded secret. With this incredible weapon — a Buck Rogers gun come to life — one man at short range can do devastating damage.

Then there are the two-man reconnaissance teams — the pioneers, blood brothers of the commandos and the rangers — who scout out enemy positions, mop up occupied villages and even fight unwary tank crews with tommy gun and pistol. They work in pairs, each man covering the other, one carrying a submachine gun and the other a .45 automatic. Deadly 28-inch bolo knives and miscellaneous other murderous gadgets may also be used on occasion.

The Wild West lives again in the training these men receive. They learn to shoot with a modern crouch version of the Old West's off-the-hip firing, aiming at sounds rather than by sighting — with 80 per cent accuracy in the daytime, 60 per cent in the dark. Their scouting and stalking technique is pure American, too, based on authentic Indian lore. In fact, they had a full-blooded Apache Indian instructor teaching at Camp Hood.

TD Tactics

The TDs fight tanks not by matching brute strength with greater strength but by thinking and acting faster than the enemy, solving his plans and thwarting them. It is a case of the agile boxer defeating the ponderous slugger by superior speed and skill, penetrating his guard with lightning jabs while eluding his roundhouse swings.

The TDs hunt the enemy until they find him, stalk him until he gets in a vulnerable position, then ambush his tanks and demolish them with superior fire power. This superior fire power is achieved by getting more hits per minute. A tank destroyer fires four or five rounds from one position, then dashes off and reopens fire before the tank's guns can begin to register.

The Tank Destroyers are organized in battalions like the artillery, held as a mobile reserve in support of an Army division or corps.

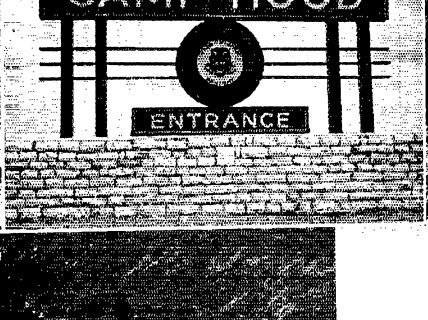
The entire tactics of the Tank Destroyers is based on communications. Skill in ambushing and stalking requires the keenest senses and fastest reflexes — and an army's communications network is but an extension of its sensory system, the nerve system linking reconnaissance and field units with the guiding intelligence represented by the command.

The Tank Destroyer must see the enemy before he himself is seen, hear him before he is heard — and then, with the enemy still unaware of his danger, strike swiftly and hard, beating him to the punch, smothering his attack, throwing him off balance and opening the way for the counterattack.

Such an operation requires detailed, infallible reconnaissance. Scouts, advance units, observation aircraft — these must search out everything there is to be known about the strength and movements of the enemy, and, each by his several means of communication, flash the intelligence back. These communications links must not fail. Should reports received from all but one sector be favorable and that one missing sector hold the key to hidden strength, disaster may result. Said Lt.-Gen. Lesley J. McNair, chief of the Army Ground Forces, addressing the TDs: "Your warning network must be multiple and surefire. Reconnaissance is of no avail if its results cannot be communicated to the fighting elements."

Again when the enemy has been found and the surprise assault launched, communications is the indispensable coördinating mesh. The TDs may be compared to a boxer's jabbing left, the supporting tanks to the cocked right hand waiting to smash through the first opening. Often the moment when that opening will appear cannot be predicted, but the instant it is sighted, the eyes — reconnaissance — must spot it and the reflexes — communications — must signal the vital information swiftly and accurately.

Only radio can do the communications job required — and only radio (apart from a modicum of visual signaling where radio silence is imperative) is used by the TDs. You can't run a telephone line to a moving vehicle. There isn't a wire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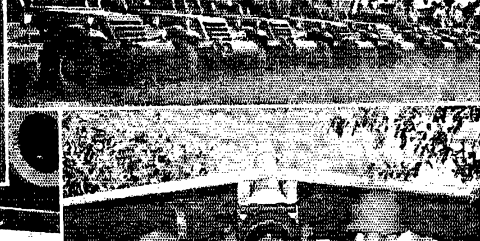


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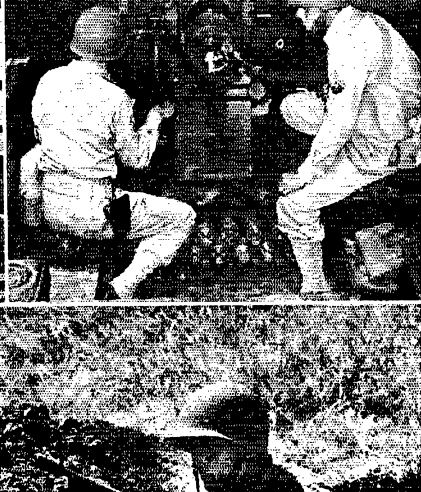


circuit in a TD outfit — except for the interphones in the destroyers, and these use the radio receiver audio systems!

It isn't the conventional military radio, however. It's the new World War II variety, where *every* tank destroyer is two-way radio-equipped and every man in the outfit can double as a radio operator.

In a typical TD battalion the vehicles range from jeeps through assorted command and armored cars to the huge but incredibly agile M-10 tank destroyers carrying turreted 3-inch guns and the half-track towed 3-inch guns which can demolish the heaviest tank with a single shot.

Many of these vehicles carry their own two-way radio installation. The equipment is of two basic types. Medium-frequency amplitude-modulated 'phone-c.w. is used, principally for communication with other units — air-ground and higher-unit liaison and the like. The second type, for intrabattalion work, is f.m. and uses voice exclusively.

Each TD battalion has a regular communications complement of specialists. In addition there are a number of voice operators in the battalion — men who have received a little training in radio theory and maintenance and a lot on operating and procedure, and who also have a knowledge of visual signaling (blinker and wig-wag, ground panels for signaling to aircraft, etc.), pyrotechnics and cryptography.

From that point on each man in the outfit is a radio operator. Every member of the TDs is trained as a voice operator — enlisted men as well as commissioned officers. Gunners, motor mechanics — all know how to put the transmitter on the air and communicate by standard procedure. During an engagement any man in a crew may be called upon to take over the duties of radio operator.

That applies only to the voice-operated equipment, of course. Operation of c.w. sets naturally requires more thoroughly qualified operators.

All c.w. work is carried on at relatively slow speeds, absolute accuracy being more important in TD work than speed. Battalion operators, for instance, need only have a receiving speed of 10–16 w.p.m. This may seem low — but to receive at such speeds accurately under battle conditions, in moving vehicles or under fire, often through jamming or blanketed by QRM, is far from simple.

In the TDs the maintenance men and technicians are called radioelectricians. The six radioelectricians in a battalion have numerous sets to maintain — which may mean anything from replacing a microphonic tube to the complete rebuilding of a complex f.m. transmitter-receiver wrecked by enemy fire.

A good TD radioelectrician could readily qualify as stand-in for a miracle man. Usually lacking anything approaching shop facilities, routine repairs and adjustments are made right in the field. These men become experts at improvisation. They learn to rig jury antennas out of stalks and barbwire; they've even found that a set will work with a dragging wire for an antenna while the vehicle is in motion. Tricks like replacing a defunct i.f. transformer with r.c. coupling become second nature.

Radio in the tank destroyers can be summed up in the phrase: "It has to work." So vital is the need for communications and so great the reliance placed upon it that failures cannot occur.

And it does work. Even the hard-to-satisfy old-time cavalry and artillery officers have learned to swear by it. One reason the TD commanders place such high value on radio is that it gives them a ringside seat for the entire action. Ordinarily in battle the scene as a whole is so confused that even observers in key positions have difficulty seeing what is going on. With the multi-channel push-button receivers, however, they can listen to the whole fight simply by pushing buttons.

Tankbusters Are Tough

The tank busters claim they have the best machines and the toughest men on earth. After what we saw of the training at Camp Hood, we've no inclination to argue with them about it. Not after those obstacle courses, for example; we've seen none to compare in their demands on stamina, agility and courage. Or after the sight of coverall-clad soldiers worming their way across jagged terrain under machine gun fire — with streaking tracers not 3 feet above their rumps but 12 to 18 inches above and with land mines exploding all around.

And certainly not after hearing some of the scattered tales now beginning to drift back about the first TD units to see action in Tunisia. Here's just one, to show what we mean. It's about an M-10 tank destroyer and its crew waiting alongside a road, nominally in enemy territory, to ambush a column of Nazi tanks reported by scouts to be heading that way. The scouts were right, too; the leading tank showed up on schedule over a ridge 1000 yards away. Bracing themselves for the shock when the 3-inch gun would be fired, the crew looked expectantly at the gunner. He sat there calmly, unmoving. The column came rapidly nearer, the leading tank now only 600 yards away. Still the gunner didn't fire.

"What are you waiting for?" the lieutenant in command demanded. "Why don't you shoot?"

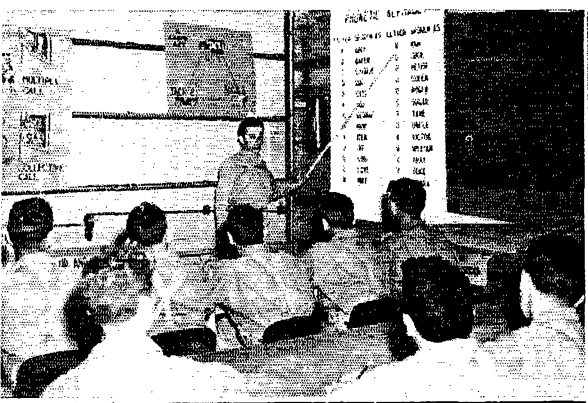
"Hell, I'm only waiting until they get near enough so's I can draw a bead on 'em," was the gunner's unperturbed reply. Finally, when the leading tank was only 400 yards away, he fired, knocking its turret cleanly off with the first shot. The remaining tanks, so the story goes, promptly turned and scattered. They'd had enough of the Tank Destroyers.

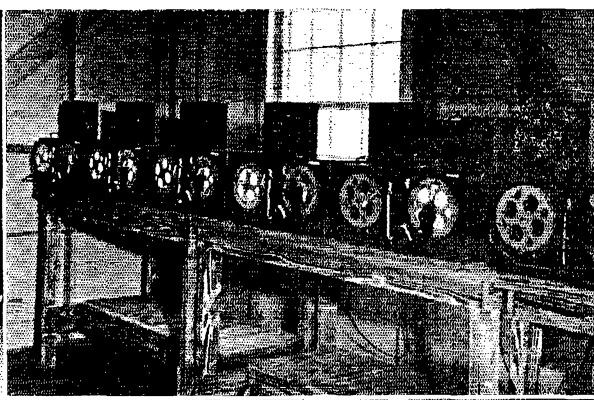
The motto of the TDs, blazoned around the cougar's head on their insignia, is "*Seek — Strike — Destroy.*" Selected in competition from a number of entries, it barely edged out the second choice: "*Guns and Guts.*"

Somehow, we almost wish that second motto had been chosen. No words could better describe the Tank Destroyers.

Above — Voice operators in a TD battalion operating a push-button f.m. set installed in a command car.
Below — Voice procedure class. Wall charts and visual cartoon-type lessons augment lecture instruction.

Above — C.w. operator in action, key strapped on leg. A.m. voice may also be used (note microphone).
Below — Battery of tape machines, each operating at a different speed, transmit hand-recorded code instruction.





Above — Voice operators studying a standard f.m. set. They learn tuning, adjustment and maintenance.
Below — An operator's class on a field problem. A forest of antennas rises above the motorized caravan.

Above — C.w. operators in code class. Students move up from table to table as their code speed increases.
Below — Preventive maintenance class for c.w. operators. Students study gear as instructor lectures.

Radio Training at Camp Hood

New as the tank destroyers themselves, as efficiently and cleanly engineered to do its training job, is the "Home of the Tank Destroyers" — Camp Hood.

There — deep in the heart of Texas, where the stars at night *do* shine big and bright — in an orderly new camp comparable to a suburbanized city, the Tank Destroyers are trained in a rugged, wrenching routine that makes supermen capable of battling 30- and 60-ton monsters out of ordinary American men and boys.

As though Nature had fashioned it specifically for this purpose, the vast reservation includes terrain of every character required in tank-buster training — flat, dusty plains blending into rolling farmland bordered by wooded hill country with sharp ridges and ravines.

Appropriately named in honor of the great Civil War General, John Bell Hood, whose Texas Brigade achieved immortality in the War between the States by tactics providing historical precedent for those of the present TDs, Camp Hood first began to sprout on the fertile farmland adjacent to the village of Killeen in February, 1942. To the site — chosen in January by the commander of the TDs, Major-Gen. A. D. Bruce, who saw in it the complete answer to the varied requirements of TD training — came the nucleus of the Tank Destroyer command, which had been officially initiated only a week before the declaration of war — on December 1, 1941, to be exact — at Fort George G. Meade, Md. By July a preliminary training program had been instituted and on September 18th Camp Hood was officially inaugurated as the Tank Destroyer Center.

At the time of our visit, seven months later, Camp Hood proper was a finished entity. Along miles of broad avenues, criss-crossed by numbered streets, stood hundreds of wooden buildings spotless in gleaming white paint — all construction finished, debris cleared away, grounds and streets orderly and clean. Only across the reservation, at North Camp Hood, a new "sub-division" where a part of the training program is being transferred, was construction still in progress.

It was a Sunday afternoon when the southbound Texas Special unloaded at the Katy station in Temple and delivered us to the waiting TD driver. Thereafter for three days we lived the life of a soldier in mufti at Camp Hood.

If you'll come along we'll try to picture the character of the men and their training we saw during those three days.

Tank Destroyer radio training for enlisted men is carried on in three distinct and separate phases. The first of these is the Replacement Training Center, where preliminary training is given all categories of prospective radio operators. The second is the Radio School, where detailed classroom and field instruction in theory, operating and practice, is given. The third is the Advanced Unit Training Center, where specialist students are given collective training under field conditions and coördinated into a skilled, smoothly-running team.

There are officer training and OCS schools at Camp Hood, too, but this story concerns the enlisted men's training as we saw it there.

Replacement Training Center

At the Replacement Training Center, under the command of Col. Walter Dumas, the TDs receive their initial training — 13 weeks of it, unless they show that they have the stuff to make c.w. operators or radioelectricians, in which case they take only the first nine weeks and then move over to the TD School for specialist training.

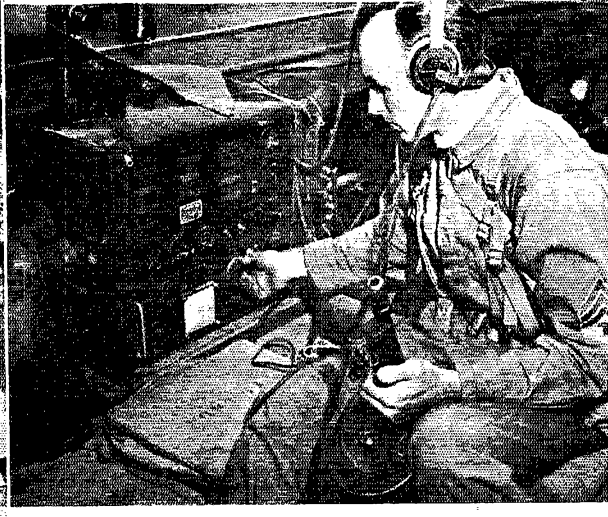
In that first nine weeks of training every man acquires a grounding in the basic essentials of radio communication. The course begins with a general outline of TD communications and then goes into detail with fundamental electrical and radio theory (through d.c. circuits and Ohm's Law), rudimentary explanations of the characteristics of radio communication (f.m. vs. a.m., etc.), a solid chunk of training in voice procedure (17 intensive hours of lecture and drill) including field net operation, and enough instruction in the operation of radio equipment to teach the student what switches to throw and what knobs to turn.

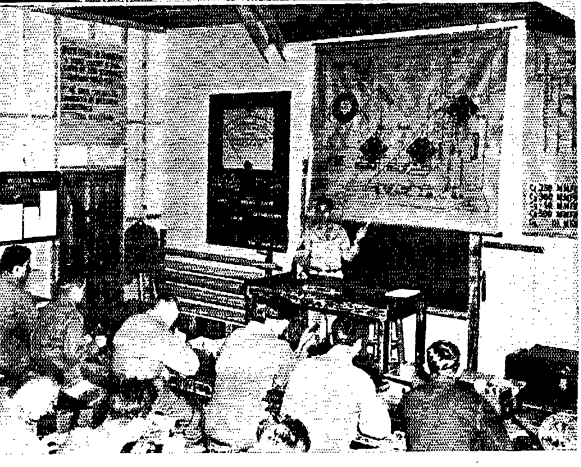
The bulk of the men completing this initial nine weeks of training — those scheduled to become voice operators — stay on at RTC for four additional weeks and then are placed on the battle replacement lists for unit training. A great deal of ground is covered in that four-week period. Imagine learning the following in that time:

Visual signaling (flashlight and wigwag, as well as ground panels for signaling aircraft), message center procedure, messenger training (everything but the delivery of singing telegrams), cryptography (10 hours to acquire a lifetime's knowledge, including those trick adding-machine-type encoding and decoding machines), pyrotechnics, and messages and signal orders (which to a traffic man means the chapter on message handling — Army style). At the end of the list comes ten hours of preventive maintenance for radio equipment.

It might seem that to train a man in all these subjects in so little time would mean giving him at best only a superficial smattering of knowledge. But such is not the case. Capt. N. J. Cummings, the competent S-3 officer who prepared the courses, has done such a thorough job that any student with sufficient native intelligence can acquire and retain all the essentials required.

Part of the reason lies in the effective visual training methods and practical demonstrations employed. In cryptography, for example, large wall charts with overlapping pin-up strips which relate the various steps in coding and decoding replace the formal texts and much of the lecture discussion that would otherwise be required.





Above — A typical TD radio operator ready for action — of any kind! The all-frequency SCR 193 transmits on either a.m. 'phone or c.w., while the tommy gun promises high-speed reception for enemy snipers.

Below — In the TD Radio School lab experienced technicians periodically check and align the dozens of standard sets required for class instruction. Every set is "on the nose" before a student gets it — except for those in which trouble is deliberately introduced for the purpose of giving practice in servicing equipment!

Bottom — Three officers at the TD School watch a lab technician check over a standard low-powered f.m. transmitter-receiver. *L. to r.* — Lt. Rein, an ex-amateur operator, Pvt. Lewis, Major Devine and Lt. Wilder, W3EZG.

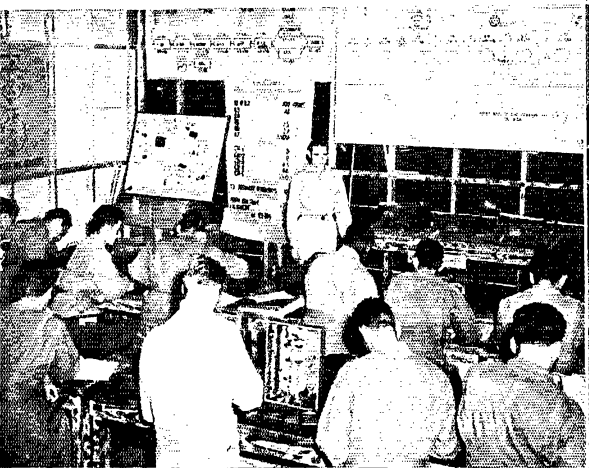
Official U. S. Army Signal Corps—Camp Hood Photographs

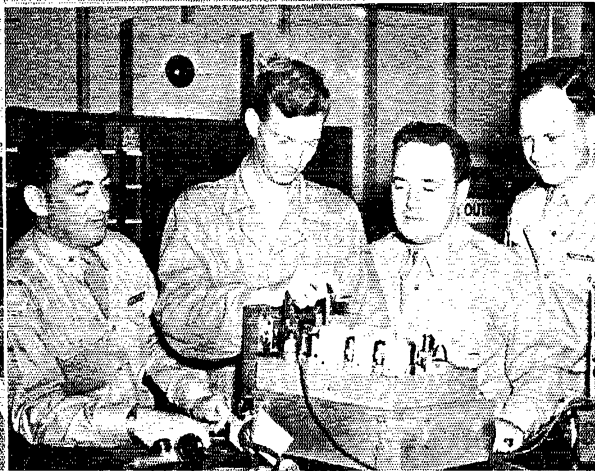
Radioelectrician training in the Tank Destroyer School's communications department at Camp Hood.

Top — Shop practice. Each pair of students is supplied with a comprehensive field tool kit, exactly as used in actual service, including every useful type of hand tool. Small receiver kits, etc., of standardized design are assembled by students working in teams.

Above — Shop class instructor explains the construction of the simple receiver kit being assembled by the students, with the aid of large wall-chart pictorial layout and circuit diagrams. Note the super-scale mockup of a standard test instrument panel at center left.

Below — Practical equipment class in session. Student teams follow instructor's explanation of standard TD radio equipment by locating parts and tracing wiring on actual sets. Working breadboard models which duplicate circuit diagrams aids in visualization.





Again, in the voice procedure class large cartoon charts make the same point in a single sketch that an hour's lecture would require — and do it more lastingly.

In network classes twenty minutes of lecture explanation is followed by two hours of practical work over actual circuits, the students being grouped at code practice tables with mikes plugged into the keying circuits. QRM from the fellow beside you? Sure — but that's the way it is in the field, too. Anyway, the man you're working is several tables away and the only way you can hear him is through the 'phones. It's good training, for when the next step — actual field operation — comes along, there'll be a monitor acting as an enemy station, breaking in on the channel, trying to jam you or mislead you with false messages.

The same general methods are applied in teaching theory and set operation. Again large charts show the radio spectrum in terms of the frequency channels used by the TDs, as well as the respective sets used and their functions in the overall military picture. Other charts illustrate proper and improper practices — location of sets for various jobs and in different terrain, their practical ranges and so on. In set operation the students work in teams on actual equipment, learning step-by-step adjustment procedure by duplicating the instructor's "Throw switch on," "Adjust trimmer No. 1 for maximum noise level," "Adjust trimmer No. 2 . . ." and so on.

Learning by seeing and doing — that's the way radio operators are trained at Camp Hood.

Tank Destroyer School

But that's only the beginning. The more intensive radio training for radioelectricians and c.w. operators is given at the Tank Destroyer School, commanded by Brig. Gen. Hugh T. Mayberry. Not less than 1500 new faces each week come to the TD School's Communications Department, headed by Major Park W. Bailey. There men with the proper aptitude and qualifications receive a full-scale education in radio in 8 weeks — the shortest and perhaps the most intensive course of its kind given in any of the military services.

The training course, developed by Major D. J. Devine, is unique in both brevity and scope. It is a course with a highly specialized objective — to teach everything there is to know about the operation and maintenance of the three specific types of TD radio sets. "We teach them *sets* — not abstract principles," Major Devine explained.

Because of that specialized purpose the course differs considerably from the more general radio training courses given elsewhere. The limited objective is only part of the reason why the course has been so successfully compressed, however; equally important in that result are the novel training methods employed.

Here, too, there is great emphasis on visual instruction and learning by doing. "Sometimes we're accused of being 'chart happy,'" Major Devine admitted. "But we don't mind — the important thing is that the students *do* learn our way." Evidence of this emphasis on charts and super-scale mockups may be seen in the accompanying classroom photographs.

Dissecting the course, the first week begins with orientation, giving the students a preview of what they are to learn and why. During this period each student is given a series of aptitude and classification tests designed to tabulate his personal characteristics and abilities — of which more later.

Then the detailed training begins. On the technical side the course is divided roughly into two halves — the first covering theory and the second practice.

Perhaps the word "theory" should have been put in quotes; certainly that part of the course is anything but theoretical. It represents a well balanced grounding in fundamentals, presented in down-to-earth working fashion rather than as abstract principles. Lab experiments, display boards and an RCA "Dynamic Demonstrator" translate textbook rules into visual examples. There are four weeks of this combined lecture-demonstration teaching.

Concurrently, the elementary shop work, which occupies a total of 43 hours, is begun. At the start of this class each pair of students is provided with an elaborate T-48 metal tool chest exactly as supplied TD maintenance men in the field. This kit contains some two dozen tools — everything from a half-dozen pairs of pliers and as many assorted screwdrivers to a soldering iron, files, ball peen hammer — even to an oil can and a flashlight.

Thus equipped, the students start assembling standard Meissner receiver kits in teams. Shop work continues throughout the course.

After the fourth week, theory having been completed, the practical equipment phase begins. Here the purpose is to acquaint the student in complete detail with each specific type of equipment used by the TDs.

The first two weeks in this class are devoted to a.m., beginning with the compact, low-powered SCR-245 and finishing with the old workhorse SCR-193 and its modern successor, the SCR-506. In the concluding two weeks f.m. sets — the flea-powered SCR-610 and the SCR-608 command set — are studied.

Throughout, the students work in teams with actual equipment, correlating the units part by part with the instructor's lecture and huge wall-chart circuit diagrams. One such diagram will use ordinary schematic symbols; beside it may be a duplicate with actual parts mounted over the symbols. Interconnecting wires on the diagrams are colored to correspond with the color-coding in the equipment.

As the class begins study of a particular piece of gear, sectional diagrams showing separate units and sub-assemblies are shown. On succeeding days the diagrams become more detailed and complete. The location, function and detailed characteristics of each part, every piece of wire,

(*Continued on page 82*)

Rebuilding TR-4s for Non-Priority Tubes

Solving the Replacement Problem with Standard Receiving Types

BY DON H. MIX,* WITS

What to do when you can't get HY tubes for your WERS Abbott TR4s is the timely subject of this article. A simple revamping job to accommodate available tubes from the standard replacement list provides a ready answer to the problem. Under tests on the air, the non-priority job stands right up with the best.

PERHAPS your local WERS gang is up against a problem similar to the one which faced us in Bristol, Conn. When the Defense Council voted an appropriation for gear for the local net, we thought we were lucky to be able to pick up several new TR-4s from one of the dealers in the vicinity. The catch came when we found out that the special h.f. tubes for which these sets are designed weren't obtainable at any price — or on any priority which could by any stretch of rule interpretation be brought within our reach. Of course, we knew that WERS gear has been built around standard receiver-replacement tubes, but we weren't sure that they could be made to work satisfactorily in the TR-4s without alterations equivalent to building entirely new sets. We decided, however, to sacrifice one of the units, if necessary, to find out what had to be done to make them usable.

Tubes

From previous experience the 6V6GT looked like one of the best bets for replacing the HY75 in the transmitter section. For one thing, it is one of the few tubes of suitable size which will stand up under the abuse of high input at the efficiencies we normally experience at 112 Mc. At first it was thought that the 7C5, which has a low-loss loktal base, might be a better prospect, since it has characteristics similar to those of the 6V6. However, tests made with the three available samples showed definitely poorer performance.

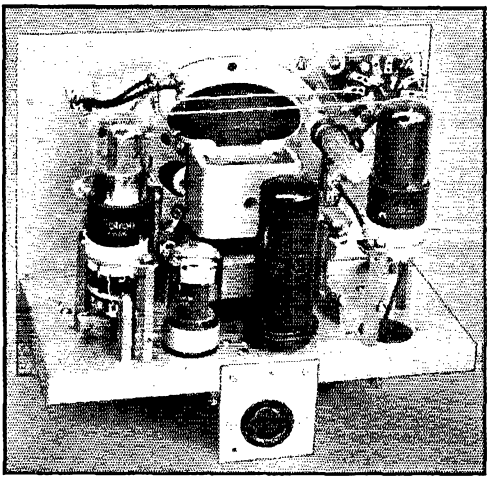
In looking over the shrunken list of obtainable tubes suitable for replacing the HY615 in the receiver section, the 6J5 seemed the best compromise between performance and availability.

The changes required to substitute these tubes, as it turned out, are not very extensive, in spite of the difference in physical and electrical characteristics. These can be made by anyone who can do a simple job with hand tools. Furthermore, a minimum of alteration in the original arrangement of the set is necessary. This may be something to be considered if the sets are supplied from community funds. In some localities the town fathers may not look too kindly on the idea of local talent ripping their nice new sets apart.

Sockets

The grid and plate terminals of both the HY75 and the HY615 are in the form of caps on top of the glass envelope. In substituting the 6V6 and 6J5, provision has to be made to transfer these connections to the socket. It is highly desirable to have sockets with better insulation than the black bakelite furnished with the set. The easiest way to accomplish this objective, therefore, is to provide new ones, leaving the original sockets in place with their connections intact. This arrangement leaves the set ready to use the HY tubes with a minimum of reconstruction when and if these tubes become available.

The new octal sockets should, if possible, be of Isolantite or one of the other low-loss materials. As shown in the accompanying photographs, they are elevated above the original sockets to bring the plate and grid terminals of the new tubes as close as possible to the original connecting points. The sockets can be raised to a height of 2¼ inches on pillars or brackets and still leave enough room above so that the tubes can be easily removed without taking the unit out of the cabinet. The sockets shown in the photographs are mounted on 2¼-inch lengths of ¼-inch square brass rod, drilled and tapped for 6-32 screws at each end. Where brass rod of some sort is not obtainable, brackets of strip stock or pillars of insulating material might be substituted.



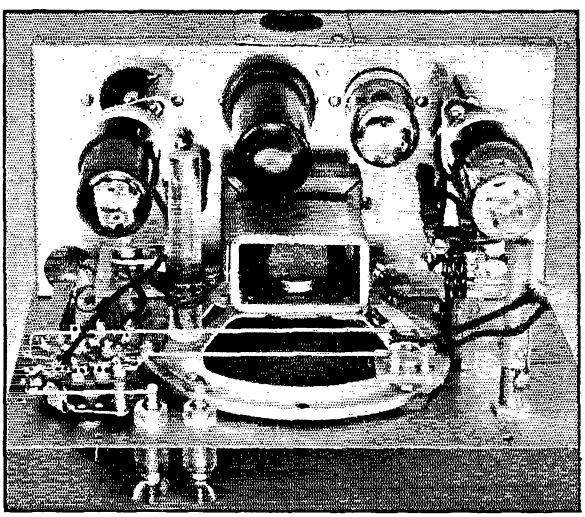
New tube sockets are mounted on pillars directly over the old ones. A minimum of re-wiring is required.

* Asst. Technical Editor, *QST*.

Strip brackets may be considered easier to make, since they do not require tapping. Before drilling the holes in the chassis for the bottoms of the pillars, be sure that the holes are spotted so that the drill doesn't tear into the components underneath.

In the transmitter section, the socket should be orientated so that the location of pins 5 and 3 (grid and plate terminals of the 6V6) make shortest leads possible. The flexible plate and grid leads found in the set, with their connecting caps, should be removed and saved for future use. It ought to be possible to reduce the original length of the grid lead by about ¼ inch without exceeding the original plate-lead length by more than a similar amount. Before mounting the socket on the pillars, pins 1, 7 and 8 should be connected together and a lead a couple of inches long attached. This connects one side of the heater to the cathode. Since the 6V6 is operated as a triode with screen and plate connected together, pins 3 and 4 should also be connected together and a short lead extended. Another short lead should be soldered to pin 5 for the grid connection and a lead about 4 inches long to pin 2 for the ungrounded side of the heater. The socket may now be mounted on the pillars and the various leads connected to appropriate points. The grid connection (pin 5) goes to the junction of the grid condenser and r.f. choke, while the plate lead (pins 3 and 4) goes to the stator terminal of the variable tuning condenser. The wire from pins 1, 7 and 8 should be grounded to the nearest supporting pillar or to the nearest point on the chassis. The ungrounded heater wire (pin 2) is passed down through the center hole of the unused socket and soldered to pin 2.

To hold the input down to a safe value, the resistance of the grid leak (originally 10,000 ohms) should be increased to 12,000 or 15,000 ohms. This can be done by replacing the original grid-leak resistor with one of higher value, or by adding 2000 to 5000 ohms in series.



New coils of reduced size must be installed because of increased interelectrode capacitances in the receiver-replacement tubes.

Coils

Because of the difference in tube characteristics, the size of the transmitter tank coil must be reduced from 4 turns to 2 turns of the same diameter. It will probably be advisable to wind a new coil and save the old one for possible use in the future. No. 12 antenna wire is suggested for the new coil, and it may be wound by using the lucite rod which holds the antenna coupling coil as a form. Leave enough wire at the ends of the coil for making connections to the tuning condenser. After removing the coil from the form, give the turns a slight twist to reduce their diameter so that they will fit snugly over the lucite rod; otherwise the rod will not be held firmly in place. In the model with which we worked, the antenna coupling coil was wound much nearer one end of the rod than the other. We found it necessary to reverse the rod so that the short end was inserted in the tank coil; otherwise the end of the rod would hit the speaker frame when the position of the coil was adjusted for tight coupling.

The band may be centered on the tuning dial by changing the space between turns. In this model, the band was centered with the turns quite close together.

A similar procedure should be followed in mounting the 6J5 in the receiver section. By proper positioning of the new socket, the grid lead need not be over a half-inch long. The grid leak and condenser should be twisted around so that they drop down toward the tube socket from the supporting lead to the rotor of the tuning condenser. Pin 5 is the grid terminal and, with the socket turned so that this terminal comes in front, the plate terminal (pin 3) will require a lead about 2 inches long to connect it to the stator terminal of the tuning condenser. Pins 1, 7 and 8 should be wired together and connected to one of the grounded terminals of the old socket underneath. Pin 2, the ungrounded heater terminal, should be connected to pin 2 of the old socket.

The original tank coil of 6 turns must be reduced to one of 3 turns. Here, again, it would be better to make a new coil and save the old one. In mounting the new coil, the ends should be bent in such a way that the coil is in proper relation to the variable antenna-coupling coil. While it should be satisfactory to make the connection to the r.f. choke at one end of the coil if the choke is a good one, it is noted that the manufacturer has made the connection to a tap on the coil. Since this means that less dependence need be placed on a perfect choke, it is a good practice to follow. We made this connection to the middle turn of the three-turn coil. It is probably

(*Continued on page 32*)

HAPPENINGS OF THE MONTH

Operator Licenses Extended!

Expirations Since Pearl Harbor Reinstated; No Expirations Until December, 1944; Station Licenses Unaffected

FCC took an important action on May 25th: Every amateur *operator* license which had expired between December 7, 1941, and that date was reinstated and automatically extended for three years from its stated date of expiration. And every amateur operator license due to expire between May 26th of this year and December 7, 1944, was extended for three additional years. Thus there will now be no expiration of a ham op license until December of next year; and no action or renewal application is necessary for any of us until that time approaches. And if the war is still on then, there'll probably be another extension.

This is immensely welcome news to amateurs in the armed services and those in war work away from home — in whose behalf the action was primarily taken. It eliminates the need to remember about renewing and to mess with it under wartime conditions; and, for those who forgot to apply or were unable to do so, it eliminates the need to be reëxamined after the war. It also saves the overworked FCC both the interim paperwork and the reëxamining. And it shows the FCC hasn't forgotten about us.

The examining and licensing of applicants for *new* amateur operator license continues as usual.

The reinstatements and extension do not apply to any licensee who has failed to prove citizenship and file fingerprints; his ticket is dead. Nor do they apply to licenses voluntarily sent in to FCC for cancellation; such licensees will have to be reëxamined. Nor do they apply to licenses which have been suspended by FCC or are in future suspended; a ticket can still be washed out for cause.

And these actions have no bearing on the matter of amateur *station* licenses. We wish they did but they don't. The law is much stricter on station licenses, leaving FCC less discretion; and as a matter of policy the Commission is opposed to renewing unused licenses for idle stations of any category. Then what should an amateur do about his expiring station license, considering that FCC won't renew it, that under Order 87 the station can't be operated, and that operator licenses are being extended without application? Our answer is that it still seems best to us to apply for station-license renewal 60 days before expiration or for modification whenever "operating" address is changed. Even though FCC puts such applications in its files without action for the present, they show continuity of intention and they are available for action when the war ends. While we suppose FCC will make provision, at the end of the war, for those whose war duties made it impossible to apply, we continue to believe that our position, both common and individually, will be stronger if we have such applications on file as indication of determination to maintain amateur status.

By the way, notarization is no longer required on applications for any grade of operator license. A recent law made it a criminal offense to make false statements to any Federal agency. Notarization is still necessary on station applications, the Act so requiring.

Text of the new FCC order follows:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C.
ORDER NO. 115

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 25th day of May, 1943:

WHEREAS, present conditions render it difficult for amateur radio operators who are in the military service of the United States or engaged in war work at locations distant from their homes to ascertain the expiration dates of their amateur radio operator licenses and to make timely and proper application for their renewal; and

WHEREAS, no person is presently authorized to engage in any amateur radio station operation in the continental United States, its territories and possessions under the provisions of Commission Orders 87 and 87-A adopted December 8, 1941, and January 8, 1942, respectively; and

WHEREAS, the Commission has, under Order 87-B adopted September 15, 1942, discontinued the issuance of renewed or modified amateur radio station licenses but has continued, at the request of the military, to issue new or renewed operator licenses;

IT IS ORDERED THAT:

1. Every amateur radio operator license which by its terms expired during the period December 7, 1941, to May 25, 1943, inclusive, and has not been renewed, BE, AND THE SAME IS HEREBY REINSTATED, and the license term thereof IS HEREBY EXTENDED for a period of three years from the date of expiration provided therein.

2. The license term of every amateur radio operator license which by its terms expires during the period May 26, 1943, to December 7, 1944, inclusive, BE, AND THE SAME IS HEREBY EXTENDED, for a period of three years from the date of expiration provided therein.

PROVIDED, HOWEVER, That the provisions of this Order shall not apply to any amateur radio operator license which has been, or may hereafter be, finally suspended by Commission Order, or has been voluntarily surrendered by the licensee, or to any amateur radio operator licensee who has failed to comply with Commission Order No. 75, as amended.

3. The provisions of Section 12.26 of the Rules and Regulations to the extent that they are inconsistent with the provisions of this Order are hereby suspended until further order of the Commission.

AMATEUR WAR SERVICE RECORD

WE'RE still at it, compiling that Headquarters record of what the amateur is doing in the war — we're going to need it later. On this page is a convenient form which you may cut out, or whose essentials you may duplicate on a post card. The dope on you belongs in our file and is also what maintains our department for those "In The Services." But note that we are expanding our records to take in amateurs who are applying their skill in the radio and electronic manufacturing industry, providing their personal labors are 100 per cent devoted to war work.

Wherever you are in the war effort, please report yourself to ARRL.

BOARD MEETING

THE thirtieth year in the life of ARRL was begun by a meeting of the League's Board of Directors in Hartford on May 7th. Although we are in the midst of the difficulties of war, all but two of our divisions were represented in an all-day session of the directors which made the usual examination of our affairs and plans for our future.

By its actions, the Board served notice on the radio world that it expects the amateur's frequencies to be returned to him after the war. Following an extended discussion of problems and of ways for meeting them, the Board created a continuing Planning Committee of three directors to prepare a plan designed to secure the return of amateur frequencies as they existed before the war, and appropriated funds for their expenses. The membership of this committee will be announced soon by the President and will begin its work at once. The Board also reaffirmed its grant of extraordinary powers to the President to act as a committee of one in all aspects of protecting amateur rights and in making him an open authorization of $10,000 for the defense of amateur frequencies. It similarly reaffirmed its previous offer of the facilities of W1AW for the use of the government during the war.

Two requests were made of FCC: The testing periods for WERS were deemed inadequate and the Commission was asked to make available an additional period from 10 to 12 on Monday nights, not just during the first three months of the license but permanently. And for many reasons, notably because amateurs on foreign duty have found it impossible to file even informal applications for the renewal of their licenses, the League asked the Commission to make effective, until further order, all amateur operator licenses prevailing as of December 7, 1941 — indefinite extension of existing licenses and reinstatement of those that expired since Pearl Harbor.

League by-laws require a certain continuity of membership to be eligible for director, alternate and SCM, and the member must renew within thirty days to retain this continuity. Because so many thousands of our members are absent in the armed forces, the Board enacted an amendment in their behalf, providing that this aspect of eligibility will be deemed to have been continuous if a member serving in the armed forces renews his membership within ninety days after discharge from military duty. Incidentally, the desirability of establishing a class of Life Membership was referred to a committee for study.

ARRL is going to carry on its democratic processes throughout the war. The Board overwhelmingly voted down a proposal that might have done away with Board meetings during the remainder of the war, and it similarly rejected a suggestion that incumbent directors receive new terms of office if nominations were not secured on the first solicitation. It also appropriated funds for the continuance in 1944 of the usual administrative activities of the directors in their respective divisions.

On the financial side, the business affairs of the League were found to be in flourishing condition and the Board addressed its thanks and compliments to the Headquarters gang for their admirable showing under wartime difficulties. As a business precaution, it was decided to take out insurance on the Secretary's life, payable to the

AMATEUR WAR SERVICE RECORD

Name

Present mailing address

Rank or rating

Branch or bureau: Signal Corps, AAF, Buships, WAVES, etc.
If civilian industry, give title and company.

Call, present or ex; or grade of op-license only

SERVICE

- ☐ Army
- ☐ Navy
- ☐ Coast Guard
- ☐ Marine Corps
- ☐ Maritime Service
- ☐ Merchant Marine
- ☐ Civil Service
- ☐ Radio industry, 100% war

League. The question of a retirement pension plan for Headquarters employees was lodged with the Finance Committee for study and recommendation.

Those were the high lights. Here are the minutes themselves:

MINUTES OF 1943 ANNUAL MEETING OF THE BOARD OF DIRECTORS, AMERICAN RADIO RELAY LEAGUE

May 7, 1943

Pursuant to due notice and the requirements of the by-laws, the Board of Directors of the American Radio Relay League, Inc., met in regular annual session at The Hartford Club, Hartford, Conn., on May 7, 1943. The meeting was called to order at 9:12 A.M., Eastern War Time, with President George W. Bailey in the chair and the following other directors present:

Charles E. Blalack, Vice-President
Alexander Reid, Canadian General Manager
Elbert J. Amarantes, Pacific Division (alternate, acting)
E. Ray Arledge, Delta Division
Wayland M. Groves, West Gulf Division
Robert A. Kirkman, Hudson Division
William P. Sides, Southeastern Division (alternate, acting)
C. Raymond Stedman, Rocky Mountain Division
Karl W. Weingarten, Northwestern Division

There were also present Acting Communications Manager George Hart, Treasurer D. H. Houghton, Assistant Communications Manager Carol A. Keating, General Counsel Paul M. Segal, Assistant Secretary C. A. Service, jr., and Secretary & General Manager K. B. Warner. Also in attendance, at the invitation of the Board, as nonparticipating observers, were Alternate Director George Rulffs, jr., Hudson Division, and Assistant Secretary (on leave from ARRL) A. L. Budlong. The meeting was welcomed and briefly addressed by President Bailey.

On motion of Mr. Arledge, VOTED that the minutes of the 1942 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary. Mr. Amarantes asked to be recorded as not voting.

On motion of Mr. Weingarten, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

On motion of Mr. Stedman, VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board. Mr. Kirkman requested to be recorded as voting opposed.

Mr. Reid, chairman, rendered an oral report on behalf of the Finance Committee. After discussion, on motion of Mr. Arledge, unanimously VOTED to accept the report of the Finance Committee.

On motion of Mr. Kirkman, unanimously VOTED that the annual report of the Canadian General Manager is accepted and the same placed on file. On the further motion of Mr. Kirkman, unanimously VOTED that the annual reports of the division directors are accepted and the same placed on file.

Proceeding to a consideration of subjects raised by individual directors at their own initiative:

On motion of Mr. Kirkman, after discussion, the following resolution was unanimously ADOPTED

> Whereas the present test periods provided for the War Emergency Radio Service are insufficient, the Board of Directors of the American Radio Relay League requests the Federal Communications Commission to authorize an additional permanent test period each Monday, equivalent in length and time to the present Wednesday test period.

During the foregoing discussion Communications Manager (on leave from ARRL) F. E. Handy joined the meeting at the invitation of the Board, as a nonparticipating observer. Also during the foregoing discussion the Board was in recess from 9:35 A.M. to 9:38 A.M., during which time Directors

Tom E. Davis, Dakota Division
Goodwin L. Dosland, Central Division
Percy C. Noble, New England Division
Floyd E. Norwine, jr., Midwest Division

and Technical Director George Grammer joined the meeting. Also during the discussion of the next following matter, at 9:45 A.M., Director Hugh L. Caveness, Roanoke Division, joined the meeting.

Moved, by Mr. Amarantes, that a life membership be created, the fee for same to be fixed by the Board in coöperation with the Secretary-General Manager. After discussion, moved, by Mr. Kirkman, to amend the pending motion to limit the number of such life memberships to 50. But, after further discussion, the proposed amendment was rejected. Moved, by Mr. Stedman, to amend the pending motion to specify the cost of such life membership at $100. But, after further discussion, the proposed amendment was rejected, 4 votes in favor to 8 opposed. After further discussion, on motion of Mr. Dosland, unanimously VOTED to amend the pending motion to read as follows:

> RESOLVED, that the Finance Committee is instructed to report at the next meeting on the proposal that a life membership be created, the fee for same to be fixed by the Board in coöperation with the Secretary-General Manager.

The question then being put on the motion as thus amended, the same was ADOPTED.

Moved, by Mr. Amarantes, that all operational expenses of the League be submitted to the Board of Directors in budget form for approval at their annual meeting, and that an emergency fund be created, with the amount to be fixed by the Board, for the purpose of meeting unforseen expenditures, which expenditures shall be accounted to the Board, and any unexpected balance to be returned to surplus at end of the operating year; and that the Finance Committee coöperate with Headquarters so that this policy can commence with the 1944 Board meeting, and the budget to become effective at the beginning of the fiscal year in July. But, after extended discussion, the motion was rejected.

Mr. Amarantes moved the adoption of the following resolution:

> Whereas the sudden demise of Secretary Warner would cause a financial loss to the League until a suitable successor has been trained, be it
>
> RESOLVED, that a life insurance policy on the Secretary-General Manager be maintained and made payable to the American Radio Relay League for an amount of $12,000.

Moved, by Mr. Norwine, to amend by changing the specified figure to $50,000. After discussion, on motion of Mr. Stedman, unanimously VOTED that the subject shall lie on the table until 3 P.M. this date, at which time it shall become a Special Order.

Moved, by Mr. Amarantes, and seconded by Mr. Kirkman, that committees of the Board be instructed to render their reports in writing. Moved, by Mr. Stedman, to amend the motion to apply only to the reports of the Finance Committee. But there was no second, so the proposal for amendment was lost. The question then being on the original motion, the same was ADOPTED.

Moved, by Mr. Stedman, that, solely because of the difficulty of finding eligible candidates for director, By-Law 21 be amended by adding to the existing language the following new sentence:

> *Provided*, that for the duration of the present war, if there be no eligible nominee and if the incumbent be still living and capable of discharging his duties, said incumbent shall serve an additional term of two years, or until his successor is chosen; but this proviso shall cease to exist and shall be stricken from this by-law at the conclusion of the present war.

After discussion, the yeas and nays being ordered, the said question was decided in the negative: Whole number of votes cast, 12; necessary for adoption, 10; yeas, 2; nays, 10. Those who voted in the affirmative are Messrs. Kirkman and Stedman. Those who voted opposed are Messrs. Amarantes, Arledge, Caveness, Davis, Dosland, Groves, Noble, Norwine, Sides and Weingarten. Mr. Reid abstained. So the by-law remained unchanged.

Moved, by Mr. Stedman, that Section 8 of Article IV of the Constitution be amended by adding, after the words "month of May of each year," the words "except that for the duration of the current war, the annual Board meeting shall be called at the discretion of the President; provided, however, that it shall be obligatory upon the President to

call a meeting upon formal petition of a majority of the directors." The Chair ruled the said motion out of order because its text had not been submitted 60 days in advance, as required for proposals to amend the Constitution. Moved, by Mr. Stedman, to amend Section 8 of Article IV of the Constitution by adding to the existing language the following new sentence, as formally proposed by him in February:

> *Provided*, that for the duration of the present war there shall be no such annual meetings, except that the President may call one at any time if he deems it advisable and he shall call one if so requested in writing by a majority of the Directors (or alternate directors serving as Acting Directors); but this proviso shall cease to exist and shall be stricken from this paragraph at the conclusion of the present war.

After discussion, the yeas and nays being ordered, the said question was decided in the negative: Whole number of votes cast, 13; necessary for adoption, 10; yeas, 0; nays, 13. Every director present voted in the negative, the President and Vice-President abstaining as required. So the Constitution remained unchanged.

The Board was in recess from 10:56 A.M. to 10:58 A.M.

On motion of Mr. Sides, after discussion, unanimously VOTED that the Federal Communications Commission is requested to freeze the expiration of all amateur operator licenses for the duration of the war, as of December 7, 1941. On motion of Mr. Dosland, unanimously VOTED to commit the question to a committee of three, to be appointed by the Chair, to draft a resolution incorporating the substance of this motion. Whereupon the Chair appointed, as a drafting committee, Messrs. Sides (chairman), Dosland and Segal.

Moved, by Mr. Groves, that By-Law 2 be amended by adding to the existing language the following new sentence:

> *Provided*, that for the duration of the present war a member who is serving in the armed forces of the United States, and who becomes in arrears, shall not be deemed to have made himself ineligible to hold office in the League, insofar as concerns continuity of membership, provided he resumes his membership within ninety days after hostilities have ceased; but this proviso shall cease to exist and shall be stricken from this by-law ninety days after the conclusion of the present war.

On motion of Mr. Amarantes, after discussion, unanimously VOTED to amend the proposed new text to read as follows:

> *Provided*, that for the duration of the present war a member who is serving in the armed forces of the United States, and who becomes in arrears, shall not be deemed to have made himself ineligible to hold office in the League, insofar as concerns continuity of membership, provided he resumes his membership within ninety days after release from active military duty.

The question then being on the adoption of the amended text, the yeas and nays were ordered, and the said question was decided in the affirmative: Whole number of votes cast, 13; necessary for adoption, 10; yeas, 13; nays. 0. Every director present voted in the affirmative, the President and Vice-President abstaining as required. So the by-law was amended.

On motion of Mr. Groves, unanimously VOTED that the names of the alternate directors shall be added to the present list of directors published monthly in *QST*.

The Board was in recess from 11:20 A.M. to 11:26 A.M.

Moved, by Mr. Kirkman, that the Board adopt it as a special rule of order that a motion may be discussed by any director without the need for a second. Moved, by Mr. Amarantes, to amend the motion by changing the words "by any director" to "by its proposer." But, after discussion, the proposed amendment was rejected. After further discussion, the question then being on the original motion, the same was also rejected.

On motion of Mr. Caveness, unanimously VOTED that there is hereby appropriated from the surplus of the League, as of this date, the sum of three thousand five hundred dollars ($3,500) for the purpose of defraying the expenses of holding this meeting of the Board of Directors; any unexpended remainder of the sum to be restored to surplus.

On motion of Mr. Arledge, after discussion, unanimously VOTED that the sum of three thousand and seventy-five dollars ($3,075) is hereby appropriated from the surplus of the League, as of January 1, 1944, for the legitimate administrative expenses of the directors in the calendar year 1944, said amount allocated as follows:

Canadian General Manager	$ 150
Atlantic Division Director	200
Central Division Director	400
Dakota Division Director	200
Delta Division Director	150
Hudson Division Director	300
Midwest Division Director	225
New England Division Director	150
Northwestern Division Director	200
Pacific Division Director	200
Roanoke Division Director	100
Rocky Mountain Division Director	175
Southeastern Division Director	125
Southwestern Division Director	200
West Gulf Division Director	300
	$3,075

any unexpended remainders of these funds at the end of the year 1944 to be restored to surplus.

Moved, by Mr. Norwine, that By-Law 20 be amended by changing the words "to every Full Member," in the fourth sentence thereof, so that they read "to every person who on the twentieth day of October of that year was a Full Member." The yeas and nays being ordered, the said question was decided in the affirmative: Whole number of votes cast, 13; necessary for adoption, 10; yeas, 13; nays, 0. Every director present voted in the affirmative, the President and Vice-President abstaining as required. So the by-law was amended as proposed.

Moved, by Mr. Kirkman, that By-Law 42 be amended by changing the words "the current Cushing's Manual" so that they read "the Revised Cushing's Manual." The yeas and nays being ordered, the said question was decided in the affirmative: Whole number of votes cast, 13; necessary for adoption, 10; yeas, 13; nays, 0. Every director present voted in the affirmative, the President and Vice-President abstaining as required. So the by-law was amended as proposed.

At this point the Board heard supplemental oral reports from the President, Secretary and Treasurer. The Board was in recess for luncheon from 1:05 P.M. to 2:06 P.M.

On motion of Mr. Amarantes, VOTED that the Board will now review the retainer fee of the General Counsel. After review, on motion of Mr. Noble, unanimously VOTED that the present arrangement with General Counsel Paul M. Segal is continued.

Moved, by Mr. Amarantes, that the Board direct the Secretary to report to the Board more thoroughly his actions. But there was no second, so the motion was lost.

On motion of Mr. Reid, unanimously VOTED that the Board, having examined its actions at the 1940 meeting at which it granted the President extraordinary powers to act as a committee of one in all aspects of protecting amateur operation, and in which it made an open authorization of $10,000 available to him for the defense of amateur frequencies, now reaffirms those actions.

Moved, by Mr. Kirkman, that it be recorded as the sense of the Board that it believes the amateur is entitled, in the national interest, to receive for his use all pre-war amateur frequency allotments and, in addition, amateur bands in harmonic relationship, and of proportionate width, continuing indefinitely in frequency as the state of the art permits; and that, further, editorial policy of *QST* be adjusted to reflect this point of view. After discussion, on motion of Mr. Stedman, VOTED that the subject is laid on the table until the consideration of post-war plans is reached.

Moved, by Mr. Stedman, that the following be adopted as the amateur's war code, and that for the duration it be prominently displayed in each issue of *QST*: "The Amateur's War Code: To give his radio knowledge and skill to the most effective prosecution of the war effort." But there was no second, so the motion was lost.

At this point the Chair, with unanimous approval, reappointed as the membership of the Finance Committee for the ensuing year Mr. Reid, chairman, and Messrs. Caveness and Norwine.

On motion of Mr. Blalack, unanimously VOTED that the

Secretary is instructed to extend an invitation in the name of the Board to Past-President Woodruff to attend the future meetings of the Board of Directors.

On motion of Mr. Kirkman, unanimously VOTED that the Board of Directors of the American Radio Relay League, believing it to be in the national interest, hereby reaffirms previous authority vested in President Bailey to offer the use of the facilities of the League station W1AW, including plant, equipment and personnel, for the use of any governmental agency for the duration of the war. During the discussion of the foregoing matter, the Board was in recess from 3:10 P.M. to 3:17 P.M.

Moved, by Mr. Reid, that the Finance Committee be directed to investigate the present remuneration of the Secretary-Editor and the Treasurer, and that they be authorized to make any temporary readjustment of same, during the present national emergency, that they find compulsory in the interests of the League, they reporting all their decisions in this respect to the members of the Board. After extended discussion, the yeas and nays being ordered, the said question was decided in the negative: Whole number of votes cast, 12; necessary for adoption, 7; yeas, 3; nays. 9. Those who voted in the affirmative are Messrs. Arledge, Norwine and Reid. Those who voted opposed are Messrs. Amarantes, Caveness, Dosland, Groves, Kirkman, Noble, Sides, Stedman and Weingarten. So the motion was rejected. Moved, by Mr. Arledge, that the Finance Committee be directed to investigate the desirability of fixing the Secretary-Editor's remuneration partly in terms of a fixed salary and partly in terms of a percentage of the net gain from operations. But there was no second, so the motion was lost.

Moved, by Mr. Stedman, that the Finance Committee be instructed to make a study of the Secretary's proposal to create a pension plan for League employees, and to submit its recommendations to the next meeting of the Board. After discussion, on motion of Mr. Blalack, unanimously VOTED to amend the pending motion by adding to it the following words: "and that the committee be empowered to engage and pay for the services of a pension counselor as an expert adviser, at a cost not exceeding $300." The question then being on the motion as thus amended, the same was ADOPTED, 8 votes in favor to 3 opposed.

The hour of three o'clock having been reached, Mr. Dosland called for the Special Orders and the Board took from the table the pending motion of Mr. Amarante that an insurance policy on the life of the Secretary-General Manager, made payable to the American Radio Relay League, be maintained in the amount of $12,000. After discussion, the said motion was ADOPTED, 7 votes in favor to 5 opposed. On motion of Mr. Stedman, VOTED that the decision of the type of insurance to be purchased and the selection of the company in which it is placed shall be made by the Finance Committee.

At this point Mr. Sides reported for the drafting committee, and moved the adoption of the following text:

The Federal Communications Commission is requested to make effective, until further order, all amateur operators' licenses prevailing as of December 7, 1941.

Whereupon the same was unanimously ADOPTED.

On motion of Mr. Reid, unanimously VOTED that the sum of five hundred dollars ($500) is hereby appropriated from the surplus of the League, as of this date, for the use of the Finance Committee, any unexpended remainder of this sum on the date of the next annual Board meeting to be returned to surplus.

On motion of Mr. Stedman, unanimously VOTED that the Board will now proceed to a consideration of post-war plans. Extended discussion ensued. In summary thereof, on motion of Mr. Caveness, unanimously VOTED that the President is directed to appoint a continuing Planning Committee of three directors to prepare a plan designed to secure the return of amateur frequencies as they existed before the war, and to submit the same to the Board for approval at the earliest possible moment; and that the sum of one thousand dollars ($1,000) is hereby appropriated from the surplus of the League, as of this date, to defray the expenses of this committee, any unexpended remainder to be returned to surplus.

On motion of Mr. Blalack, the Board unanimously VOTED its thanks and compliments to the Headquarters staff for the splendid results they have achieved under trying conditions.

There being no further business, the Chair thanked the directors for their endeavors at the meeting and, on motion of Mr. Norwine, the Board adjourned, *sine die*, at 4 54 P.M. Total time in session, 6 hours, 23 minutes. Total appropriations, $8,075.

Secretary

OFFICERS' REPORTS AVAILABLE TO MEMBERS

In April of each year, the officers of the League make comprehensive written reports to the directors. The Board of Directors has made these reports available to the membership of the League. Interested members may obtain copies postpaid at the cost price of 50¢ per copy. Address the Secretary at West Hartford.

ON THE HOME FRONT

Presenting the licensed YL operators — for better or WERS! — on the ARRL Hq staff. *L. to r.* — Marion E. Bayrer, Circulation Department (radiotelephone third); Ethel L. Burnham, personal secretary to KBW (radiotelephone third); Barbara Messinger, Secretarial Assistant (radiotelephone third); Louisa B. Dresser, Editorial Assistant, *QST* (Class B amateur); and Carol A. Keating, W9WWP, Assistant Communications Manager (Class A amateur). All hold WERS operator permits and are active in the West Hartford civilian defense radio communications network.

January 1, 1944, for the legitimate ad-

ARE YOU LICENSED?

When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

NOTICE TO MEMBERS DISCHARGED FROM THE MILITARY SERVICES

ARRL by-laws provide that an amateur must be continuously a member of the League for at least the last four years before being eligible to be a candidate for director or alternate, and at least one year for SCM. They also normally provide that if a member becomes in arrears in his dues for more than thirty days, his continuity of membership is broken. Your attention is directed to the fact that the by-laws have now been amended on behalf of members serving in the armed forces of the United States. It is now provided that such a member, who becomes in arrears, will not make himself ineligible to hold League office, insofar as concerns a discontinuity of his membership while he was in uniform, if he resumes his membership within ninety days after release from active military duty.

While this action will have its greatest usefulness after the war is won, there are already some members being discharged from the military services by reason of being over-age or for physical reasons, etc. All such persons are advised that, if they will renew ARRL membership within ninety days following discharge, they will be deemed to have had continuous membership during the period of their military service, so far as the requirement of continuity for office eligibility is concerned. Those desirous of taking advantage of this arrangement are asked to claim the right when renewing membership, stating the beginning and ending dates for their military service.

The arrangement applies only to those serving in the armed forces of the United States. Under its terms, it cannot be made retroactive for those who have already been out of military duty for more than ninety days.

AMERICAN QUARTZ

THE government needs more quartz crystals for making oscillator plates, and is seeking to locate acceptable sources in this country. WPB has sent out a call to citizens who own property on which such quartz is located, or who know where any can be found, asking them to get in touch with the Miscellaneous Minerals Division, War Production Board, Temporary Building R, Washington. If samples can be provided, they are desired. To be useful for radio purposes, the quartz must grow in separate individual crystals, weighing at least half a pound, at least an inch thick and three inches long, colorless or light smoky. Crystals in clusters or masses are useless, as are the milky, rose and purple varieties.

HOW'S YOUR CRIMINAL RECORD?

ON April 27th, FCC supplemented its Order 75, the one that requires fingerprints and proof of citizenship, to provide that every person who holds an outstanding operator license or who applies for one "shall furnish such additional information bearing on the individual's qualifications to hold an operator license as the Commission may in writing request after examination of the application. . . ." The reason for this new order, No. 75-C, is that a small percentage of applicants have been found to have criminal records and may in future not be judged fit to possess an operator license. Where finger-print record of application shows extensive or serious past criminal conduct, it is proposed to demand further information under this order. The amateur application form will carry an additional question: "Have you ever been convicted of a crime (excluding minor offenses, such as traffic violations)?" If you have, FCC will want the dope. The order has no effect on most of us.

IF YOUR COPY OF *QST* IS LATE—

Bear with us and the nation's transportation systems. We are both doing our best — *QST* is being printed one to three days earlier to help keep deliveries on schedule — but unavoidable wartime delays do occur.

ARRL Members:

1. Slowness of delivery is beyond our control; your copy is mailed at the same time as all others for your vicinity.

2. *Don't write us* about non-delivery until at least the 10th of the following month; your copy is on the way.

3. *Renew early* and keep your file intact; the supply of replacement and back copies is sharply limited.

4. Please allow plenty of time for acknowledgment of new and renewed membership-subscription entries.

Newsstand Readers:

Because of paper limitations, newsstand quotas are unavoidably reduced. To make sure of getting your copy, *buy it from the same dealer* each month. That way we can allocate available copies to maximum advantage.

Overseas Members:

Note the expiration date on your membership-subscription certificate and renew *3 to 4 months* in advance. We can no longer backdate renewals or supply missing issues. All entries are now being made effective with the issue of *QST* current as of the date new or renewal order is received.

Under present conditions *QST* is mailed overseas at the subscriber's risk and we cannot duplicate copies.

A Different Negative-Resistance Oscillator

Utilizing Screen Voltage Regulation for Producing Negative Resistance

BY WILLIAM DAVIDON,* W2OKY

NEGATIVE resistance oscillators are noted for their stability and low harmonic content when operated at low amplitudes. They may also be used over a wide frequency range, since by definition "the negative resistance of the system does not require the presence of a tuned circuit."[1] The oscillator here described possesses these qualities in addition to a few distinct advantages.

When the control grid voltage of a pentode is increased (more positive or less negative) and the other voltages are kept constant, the screen and plate currents will increase. If there is resistance in the screen-voltage supply, the screen voltage will decrease. This decrease in screen voltage in turn will result in a decrease in plate current. If the latter effect is greater than the former, an increase in grid voltage will cause a decrease in plate current. Since, in a pentode, under most operating conditions the plate voltage has little effect on the plate current, if a change in plate voltage is made to cause an equal change in grid voltage, and the previous condition exists, the plate will show negative resistance. It can be easily shown that

$$R = \frac{r_p}{1 - \mu_{g-p} - A_{g-s}\mu_{s-p}}$$ (Filament and suppressor grid voltages constant)

where R = effective plate resistance
r_p = plate resistance with constant control and screen grid voltages
A_{g-s} = voltage gain between control and screen grid
μ_{g-p} = amplification factor between control grid and plate at constant screen voltage
μ_{s-p} = amplification factor between screen grid and plate at constant control-grid voltage

Since A_{g-s}, μ_{g-p}, and μ_{s-p} are all negative, the second term in the denominator will be positive while the third term is still negative. (It is interesting to note that, in a degenerative amplifier in which the variations in screen voltage are rightfully disregarded, since A_{g-s} is equal to zero, the plate resistance is less than r_p, which agrees with the equation given.) If $A_{g-s}\mu_{s-p} > 1 + \mu_{g-p}$, the denominator will be negative and the effective plate resistance will be negative.

Fig. 1 shows the circuit used to obtain the characteristics shown in the graph in Fig. 2. Because of the fairly large range of nearly constant negative resistance — 38 to 43 volts — outputs of about 2.5 peak volts can be obtained if the operating point is carefully selected. Since this point is in the positive grid region, resistor R is necessary in the oscillator circuit of Fig. 3. It will be noticed that the value of the negative resistance is low, about 5000 ohms, permitting a low L/C ratio to be used in the oscillator circuit and thus further improving the output wave-form. This low value of negative resistance might also be used to good advantage to satisfy the need for a "pliodynatron" of low negative resistance for a resistance-tuned amplifier.[2] The suppressor grid

(*Continued on page 74*)

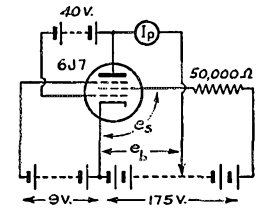


Fig. 1 — Circuit used for obtaining points for plotting negative-resistance characteristics in Fig. 2. Grid, screen and suppressor supply voltages are fixed; plate voltage is varied.

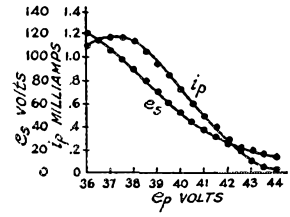


Fig. 2 — Behavior of plate current and screen voltage with increasing plate voltage when using the circuit of Fig. 1. The plate resistance is negative from about 38 to 43 volts.

[2] Sewall, "Resistance Tuning," Proceedings of the IRE, Vol. 22, page 709.

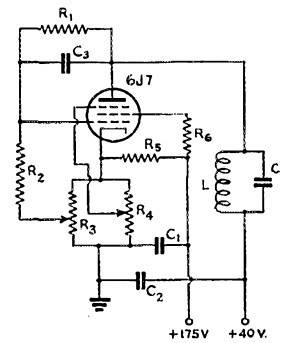


Fig. 3 — Tuned-circuit negative-resistance oscillator.
C_1, C_2, C_3 — 0.1 μfd.
R_1 — Adjusted to bring control grid to + 0.5 volt (about 6 megohms with voltages indicated).
R_2 — 0.5 megohm.
R_3, R_4 — 2000-ohm pot.
R_5 — 25,000 ohms.
R_6 — 50,000 ohms.
L, C — To resonate at desired frequency.

* 7543 Buckingham Dr., Clayton, Mo.

[1] Henney, "Radio Engineering Handbook," 3rd Edition, McGraw-Hill Book Co., page 300.

IN THE SERVICES

BECAUSE of the new three-column format, which makes it possible to include many more names, we are able this month to list men in the Merchant Marine and Maritime Service. Civil Service lists will be coming up shortly.

Someone has written that there aren't very many hams in the Marine Corps. How about that? If it's true, we want a record of everyone who is — and some pictures, please!

Ham Hospitality this month is in the "Correspondence from Members" department. C. E. Ballard, W5IXT, writes about "those New Zealand hams"!

ARMY—SIGNAL CORPS

This time a lawyer didn't have to use words! George Mihaiu, W8OGV, was just a plain old draftee but when he showed his ham ticket a code test clinched him for the Signal Corps. Fellows, be sure to show your license when you come up for classification!

1BUU, Hathaway, Cpl., Camp Crowder, Mo.
1CHG, Pepka, T/Sgt., Camp Pinedale, Cal.
1ERX, Harrington, 2nd Lt., Alexandria, Va.
1ICW, Robinson, Sgt., Ft. Myer, Va.
1JGK, Truss, T/5, Warrenton, Va.

1JJ, Buckingham, Major, address unknown.
1JKT, Collins, Pvt., Atlantic City, N. J.
1JRV, Dlugos, Lt., Drew Field, Fla.
1KRA, Taylor, T/3, Warrenton, Va.
1KUO, Baldwin, Cpl., Drew Field, Fla.
1KYO, Perkins, T/4, foreign duty.
1MQV, Wallace, Sgt., South Boston, Mass.
1MXB, Sinnett, S/Sgt., Ft. Monmouth, N. J.
2AJS, Coroff, Cpl., address unknown.
2ALP, Darlington, Capt., address unknown.
2AMA, Buck, Pvt., address unknown.
2APJ, Wolfe, Pvt., Drew Field, Fla.
2AXZ, Kronke, 2nd Lt., Ft. Monmouth, N. J.
2BED, Levin, Lt., address unknown.
2BOZ, Cantor, Pfc., address unknown.
2FEN, Wagner, Major, Ft. Monmouth, N. J.
2FKE, Matusewich, Sgt., foreign duty.
2FPT, Kahn, Cpl., address unknown.
2GGN, Esto, Pvt., Ft. Monmouth, N. J.
2GW, Bostwick, 2nd Lt., Ft. Monmouth, N. J.
2HCM, Hudowalski, Lt., foreign duty.
2HFI, Klein, T/4, Warrenton, Va.
2HTX, Woodruff, Lt., Ft. Monmouth, N. J.
2IMJ, Williams, 2nd Lt., Camp Crowder, Mo.
2JEY, Caltagiorne, Pvt., Ft. Riley, Kansas.
2JFS, Hills, S/Sgt., foreign duty.
2JKN, Robins, T/5, Warrenton, Va.
2JOD, Fischer, Sgt., Camp Crowder, Mo.
2KAI, Bilz, Cpl., Ft. Monmouth, N. J.
2KGZ, Bison, Sgt., Ft. Monmouth, N. J.
2KIK, Grossman, 2nd Lt., Ft. Monmouth, N.J.
2KJR, Christenson, 2nd Lt., Ft. Monmouth.
2KVE, O'Mara, Pvt., Warrenton, Va.
2KXD, Bluhm, Pvt., Washington, D. C.
2KYB, Aspell, Pfc., Warrenton, Va.
2LAD, Rubin, 2nd Lt., Ft. Myer, Va.
2LEG, Risso, Sgt., Camp Crowder, Mo.
2LGV, VanLiew, T/4, Washington, D. C.
2LIQ, Britton, Pfc., Drew Field, Fla.
2LIT, Karpel, Sgt., Camp Murphy, Fla.
2LRW, Reeds, 2nd Lt., Ft. Meade, Md.
2MBF, Schwartz, Lt., address unknown.
2MDE, Young, Pvt., Warrenton, Va.
2MDU, Geerewics, Pvt., address unknown.
2MRN, Mucha, Cpl., Camp Crowder, Mo.
2MRS, Ficarra, Pvt., foreign duty.
2MUM, Wolheim, 2nd Lt., Ft. Jackson, S. C.
2MXS, Schimmel, 2nd Lt., Ft. Monmouth.
2MVE, Sibley, Lt., Nashville, Tenn.
2MYY, Donovan, S/Sgt., Ft. Monmouth.
2NBL, Boychuk, Pvt., Atlantic City, N. J.
2NEY, Buffiack, Pvt., address unknown.
2NIW, Alfano, T/Sgt., Camp Crowder, Mo.
2NNQ, Gordon, Pvt., address unknown.
2NSH, Halfon, Cpl., Camp Rucker, Ala.
2NXN, Smith, Pvt., Ft. Monmouth, N. J.
2OBG, Potts, Lt., foreign duty.
3ETA, Fox, Washington, D. C.
3FRE, McCann, Major, Washington, D. C.
3FWI, Lipschutz, Cpl., Ft. Monmouth, N. J.
3FZX, Riddiough, 2nd Lt., Ft. Monmouth.
3GCR, Korsnak, Pvt., Camp Crowder, Mo.
3GRP, Buttasoni, M/Sgt., Ft. Myer, Va.
3GUV, Richardson, T/3, Ft. Myer, Va.
3HMG, Kerper, Pvt., Camp Campbell, Ky.
3HQK, Patti, 2nd Lt., Ft. Monmouth, N. J.
3HTW, Tauberschmidt, T/5, Ft. Monmouth.
3IKP, Ostroff, Pvt., Camp Crowder, Mo.
3IKN, Page, T/3, Ft. Myer, Va.
3ILU, Robertson, S/Sgt., Ft. Monmouth.
3IUV, McNamara, Pvt., address unknown.
3IYV, Collins, T/5, Warrenton, Va.
3IZU, Fisher, Cpl., Ft. Benning, Ga.
3JEW, Brogan, Pvt., Camp Bowie, Tex.
3JHF, Kiser, S/Sgt., Ft. Myer, Va.
3JHG, Bowden, T/Sgt., Ft. Myer, Va.
3JXN, Royall, S/Sgt., Ft. Hancock, N. J.

Cpl. Vic Nelson, W9CCY, was stationed at Maxwell Field with the Air Forces when this picture was taken. The back yard is that of Larry Smythe, W4GBV, Alabama's SCM, and the picture was sent in by Art Rydberg, W9AED, SCM of Vic's home state, Iowa. Thanks to the SCMs!

4AKV, Wrennick, Pvt., Camp Blanding, Fla.
ex-4CGV, Dort, T/3, Ft. Myer, Va.
ex-4DTR, Fuller, Lt., address unknown.
4EBZ, Thompson, Pvt., Camp Crowder, Mo.
4EDM, Fuller, Pvt., Camp Davis, N. C.
4FFJ, Munns, 2nd Lt., Camp Crowder, Mo.
ex-4FSQ, Gossett, S/Sgt., Ft. Myer, Va.
4GAO, Abrams, Sgt., foreign duty.
4GJG, Stricklin, Sgt., Camp Murphy, Fla.
4GMV, Herring, Pvt., Lexington, Ky.
4GPO, Wolfeld, 2nd Lt., Ft. Monmouth, N. J.
4GTI, Hunt, T/4, Ft. Myer, Va.
4GVG, Grant, T/Sgt., Warrenton, Va.
4ICT, Morgan, Pvt., West Los Angeles, Cal.
4NG, Day, M/Sgt., Warrenton, Va.
4WD, Dobbins, Major, foreign duty.
5AAJ, Giacomini, Cpl., Ft. Monmouth, N. J.
5AKZ, Porter, Lt. Col., foreign duty.
5CAK, Boatright, Cpl., Ft. Monmouth, N. J.
ex-5CFD, Smith, Pvt., Ft. Myer, Va.
5CPC, Gauldin, T/4, Barksdale Field, La.
5DEL, Carpenter, Lt., Chicago, Ill.
5DHH, Maux, Lt., Drew Field, Fla.
5EIJ, Woosley, S/Sgt., Ft. Monmouth, N. J.
ex-5FNT, Knight, WO (jg), Ft. Myer, Va.
5GLI, Haley, Lt., foreign duty.
5GVZ, Lawrence, address unknown.
5HAQ, Wick, 2nd Lt., address unknown.
5IBV, Ledbetter, Sgt., Camp Hulen, Tex.
5IGN, Mayfield, T/Sgt., Hensley Field, Tex.
5IJN, Braswell, Lt., foreign duty.
5JXP, Thomas, Cpl., Camp Crowder, Mo.
5JYX, White, S/Sgt., Camp Crowder, Mo.
5JZM, Martin, Lt., foreign duty.
5KBX, White, S/Sgt., Washington, D. C.
5KNE, Scott, Sgt., Ft. Monmouth, N. J.
5KNR, Tomery, Pvt., Ft. Myer, Va.
5KQQ, Gergen, T/4, foreign duty.
5VZ, Bradley, T/Sgt., Washington, D. C.
6AVX, Goodwin, M/Sgt., Gainesville, Fla.
6FLT, Stangel, address unknown.
6FWU, Liblick, S/Sgt., foreign duty.
6IOU, Bianchini, Pvt., Camp Kohler, Cal.
6KND, Osborne, T/5, Camp Murphy, Fla.
6KTT, Sebabiague, T/Sgt., Warrenton, Va.
6LCH, William, Lt., Ft. Monmouth, N. J.
ex-6LNX, Donner, M/Sgt., Camp Crowder.
6MIK, Lisonbee, T/4, Ft. Myer, Va.
6MSP, Vonk, address unknown.
6NQU, Kiem, 2nd Lt., Ft. Monmouth, N. J.
6NZE, Pratt, M/Sgt., foreign duty.
6OXE, Challinor, Cpl., Rapid City, S. D.
6QHG, Edmiston, Pvt., Ft. Myer, Va.
6QLV, Schanuers, Capt., Camp Crowder, Mo.
6QOY, Eisen, Cpl., foreign duty.
6QQM, Nestler, 2nd Lt., Drew Field, Fla.
6RLX, Mandroian, Sgt., Ft. Jackson, S. C.
6RTN, Bacich, S/Sgt., Drew Field, Fla.
6RYW, Lingle, Lt., foreign duty.
6SED, Freedman, Lt., Ft. Myer, Va.
6SKJ, Twitchell, 2nd Lt., Ft. Monmouth, N. J.
6TID, Poeschel, Presidio, San Francisco, Cal.
K6TSF, Jones, T/Sgt., Warrenton, Va.
6UDH, Peirson, Sgt., Ft. Monmouth, N. J.
ex-6UEU, Vandiveer, Cpl., Ft. Monmouth.
6UJU, Chambers, 2nd Lt., Ft. Monmouth.
6UMO, Grimm, Cpl., Omaha, Nebr.
ex-7AKZ, Johnson, Cpl., foreign duty.
K7BC, Stevens, Sgt., foreign duty.
ex-7BHQ, Kendall, Lt., Ft. Myer, Va.
ex-7CCN, Aeschliman, T/3, Ft. Myer, Va.
7CWV, O'Keefe, 2nd Lt., Ft. Monmouth, N. J.
7FJY, Potts, Cpl., Athens, Ga.
7FUF, Blough, 2nd Lt., Ft. Monmouth, N. J.
7GZI, Garbutt, Pvt., Philadelphia, Pa.
7HLH, Casey, Cpl., Camp Murphy, Fla.
7HPQ, Loken, 2nd Lt., Ft. Meade, Md.
7INP, Eveland, 2nd Lt., foreign duty.
7IRS, Munro, Capt., Ft. Lewis, Wash.
7JCS, Blett, Lt., Ft. Monmouth, N. J.
8CCT, Morgan, T/5, Ft. Myer, Va.
8CNK, Johnson, Cpl., Ft. Monmouth, N. J.
8DGL, Forester, Lt., Dayton, Ohio.
8DRG, Baker, Pvt., Camp Crowder, Mo.
8GVT, Tanner, Sgt., foreign duty.
8HVY, Shaw, T/5, Warrenton, Va.
8JTW, Meaney, 2nd Lt., Ft. Monmouth, N. J.

8KCG, Propst, foreign duty.
8KML, Pichitino, 2nd Lt., Cambridge, Mass.
8MT, Yen, T/Sgt., Warrenton, Va.
8NDO, May, Cpl., New York, N. Y.
8OSH, Foster, T/Sgt., Camp Pickett, Va.
8PRV, Kennedy, Capt., Ft. Monmouth, N. J.
8PSX, Strickland, 2nd Lt., Ft. Monmouth.
8PZH, Knight, T/5, Ft. Myer, Va.
8QFQ, Hively, Lt., foreign duty.
8QJV, Walker, 2nd Lt., Ft. Monmouth, N. J.
ex-8QPJ, Greulich, T/5, Ft. Monmouth, N. J.
8QVL, Pinkerton, Sgt., Ft. Monmouth, N. J.
8RUE, Fabian, Pvt., Edgewood Arsenal, Md.
8SCN, Hufnagel, Sgt., foreign duty.
8SQU, Schaefer, Cpl., New York, N. Y.
8TKP, Baker, Pfc., New York, N. Y.
8TNG, McCartney, T/4, Ft. DuPont, Del.
8TXA, Krueger, Pvt., Atlantic City, N. J.
8UJM, Brown, T/3, Ft. Myer, Va.
8UMH, Barlow, Cpl., Camp Crowder, Mo.
8UTU, Palmer, 2nd Lt., Ft. Monmouth, N. J.
8VCX, Reed, 2nd Lt., Ft. Monmouth, N. J.
8VGW, Orvis, Cpl., Ft. Monmouth, N. J.
8VJG, Hillert, T/5, Ft. Myer, Va.
8VVZ, Moore, Lt., Patterson Field, Ohio.
8WLI, Loomis, T/4, foreign duty.
8WOI, Bavor, Pvt., Atlantic City, N. J.
9AQZ, Reichert, S/Sgt., Ft. Custer, Mich.
9BDO, Crawford, Kansas City, Mo.
9BGM, Ricks, T/3, Ft. Myer, Va.
9BKV, Varley, T/5, Drew Field, Fla.
9BXS, Rozgonyi, 2nd Lt., Ft. Monmouth.
9BXT, Hoffmeier, S/Sgt., foreign duty.
9CRL, Larsen, Cpl., Camp Murphy, Fla.
9CTC, Wiltgen, T/4, Ft. Myer, Va.
9DHF, Wickham, Lt., foreign duty.
9EDN, Mansfield, T/5, Camp Murphy, Fla.
9EUM, Roberts, Sgt., address unknown.
9GQG, Rex, Cpl., address unknown.
9GUT, Hauk, Sgt., foreign duty.
9GXO, Berggren, T/4, Ft. Myer, Va.
9HD, Schuster, Lt., Washington, D. C.
9HXO, Flassig, Cpl., Kansas City, Mo.
9HYN, Lindeman, address unknown.
9ILZ, Kunarski, T/5, Camp Crowder, Mo.
9IOW, Moriarity, 2nd Lt., Ft. Monmouth.
9JCU, Bullock, T/3, Ft. Myer, Va.
9JMW, Pasbrig, Sgt., address unknown.
9KCY, Bock, Pvt., Atlantic City, N. J.
9KZJ, Ridnouer, Pfc., Nashville, Tenn.
9NCG, Barnes, 2nd Lt., Ft. Monmouth, N. J.
9NWX, Denniston, T/3, Ft. Myer, Va.
9NXB, Viezbicke, Cpl., Ft. Monmouth, N. J.
9NYP, Woestman, Lt., foreign duty.
9OAT, Browne, Pvt., Camp Crowder, Mo.
9OCF, Strehlow, 2nd Lt., Ft. Monmouth.
9PEN, Binnquist, Pvt., Camp Crowder, Mo.
9PMV, Dahlin, Lt., Cambridge, Mass.
9POM, Morris, 2nd Lt., Charleston, S. C.
9QDC, Perrin, Pvt., Camp Crowder, Mo.
9QGS, Sullivan, address unknown.
9QPO, Castle, Capt., foreign duty.
9RLV, Leslie, 2nd Lt., Cambridge, Mass.
9RMW, Kietzman, Milford, Nebr.
9THS, Marglin, S/Sgt., Ft. Knox, Ky.
9TNC, McCandless, T/5, Camp Murphy, Fla.
9TZX, Schindler, T/5, Camp Crowder, Mo.
9UHQ, Eisler, M/Sgt., Ft. Myer, Va.
9UVA, Burke, 2nd Lt., Drew Field, Fla.
9VGK, Rosenberg, T/5, Ft. Myer, Va.
9V8J, Shelton, T/3, Ft. Myer, Va.
9WHH, Starr, Cpl., Camp Crowder, Mo.
9WNP, Hahn, Capt., Lexington, Ky.
9YNJ, Sigmon, Capt., Philadelphia, Pa.
9ZHE, Arlton, T/5, Warrenton, Va.
9ZJN, Temple, Cpl., Kansas City, Mo.
9ZTU, Marglin, Sr. Op., Ft. Knox, Ky.
9ZWW, Hill, Sgt., Seattle, Wash.

Operator's license only:

Castleberry, Philadelphia, Pa.
Cohen, Pvt., Ft. Monmouth, N. J.
Conley, Pvt., Camp Crowder, Mo.
Fulton, Pvt., Boston, Mass.
Grillo, S/Sgt., Thermal, Cal.
Henderson, Sgt., foreign duty.
Ingram, 2nd Lt., New Orleans, La.
McKay, Pvt., Brookley Field, Ala.
Miller, S/Sgt., Camp Maxey, Tex.
Milton, Cpl., Ft. Monmouth, N. J.
Schwartz, Pvt., Camp Polk, La.
Sobieski, T/4, Kelley Field, Tex.
Tyska, Sgt., foreign duty.
Young, 2nd Lt., Camp Campbell, Ky.

MARINE CORPS

1ARA, Spates, Lt., address unknown.
1MSI, Googins, Cpl. foreign duty.
1NII, Leonardo, Cpl., Washington, D. C.
2HLD, Duma, Lt., Quonset Point, R. I.
2NUG, Reichert, Pfc., Corpus Christi, Tex.
3DLF, Blackstone, S/Sgt., Camp Lejeune, N. C.
3GKN, Smith, Major, Washington, D. C.
3HPP, Merkel, Capt., address unknown.
4CVN, Eakew, Capt., address unknown.
4DPN, O'Cain, S/Sgt., foreign duty.
4HEI, Groome, S/Sgt., Corpus Christi, Tex.
5IKZ, Sullivan, S/Sgt., Corpus Christi, Tex.
5ILD, Cunningham, S/Sgt., San Diego, Cal.
5JFW, Erwin, Sgt., foreign duty.
5JMM, Mayberry, Pvt., San Diego, Cal.
6OYY, Rose, Sgt., Washington, D. C.
6RXU, Genochio, Pvt., Logan, Utah.
6TNG, Sisney, address unknown.
6UIP, Wagner, address unknown.
6UJP, Davis, M/Sgt., foreign duty.
6UQU, Honts, Pvt., San Diego, Cal.
7FDN, McFadden, S/Sgt., Corpus Christi, Tex.
8HJJ, Torpy, S/Sgt., Corpus Christi, Tex.
8SRM, Misavage, T/Sgt., Parris Island, S. C.
8UOA, Lloyd, T/Sgt., foreign duty.
8VMR, Morris, Pvt., Camp Lejeune, N. C.
8VYW, Fasulkey, Pvt., San Diego, Cal.
8WEP, Bellgraph, Pfc., foreign duty.
9FGD, Zschau, Pfc., New River, N. C.
9JCV, Calvert, S/Sgt., foreign duty.
9KIO, Harris, S/Sgt., New River, N. C.
9OEK, Brown, S/Sgt., Cherry Point, N. C.
9OFD, Culver, S/Sgt., foreign duty.
9YVJ, Weber, Pfc., San Diego, Cal.

Operator's license only:

Ellison, Pfc., Quantico, Va.
Leeb, Cpl., Lake City, Fla.

ARMY—GENERAL

There's one ham with a sense of humor serving overseas. 2nd Lt. Al Rae, W2JGF, wrote a note recently to let us know he is "safe in North Africa"!

1DCH, Abbott, Pvt., Camp Croft, S. C.
1JXR, Heil, Pvt., Ft. Bliss, Tex.
1LKE, Lojko, Lt., Ft. Jackson, S. C.
1NCJ, Anderson, S/Sgt., Ft. Bliss, Tex.
1NFT, Torrisi, Pfc., Ft. Knox, Ky.
1NFY, Shevenell, Pvt., Camp Croft, S. C.
2EOA, Kibling, Capt., foreign duty.
2FPM, Bernadyn, Pvt., Ft. Ontario, N. Y.
2HQX, Possehl, Lt., foreign duty.
2HRP, Geilenkirchen, Pvt., Camp Upton, N.Y.
2LDV, Parker, Cpl., Camp Knight, Cal.
2LRX, Santos, T/5, Ft. Hancock, N. J.
2LZB, Gibbs, S/Sgt., foreign duty.
2MIG, Berzin, WO, Camp Davis, N. C.
2MYI, Revzin, Pvt., Camp Edwards, Mass.
2NLK, Mauer, Lt., address unknown.
3FRE, McCann, Major, Arlington, Va.
3GJX, Dunne, Pvt., Camp Haan, Cal.
3HTX, Sydner, Pvt., address unknown.
3JQP, Turzer, Pvt., foreign duty.
4HNT, Roudebush, Capt., Fresno, Cal.
4HQO, Gibson, Sgt., Camp Hood, Tex.
5AHE, Beeson, Lt., Alexandria, Va.
5DQM, Tilley, Capt., Philadelphia, Pa.
5FGI, Maynard, M/Sgt., Ft. Sill, Okla.
5JOE, Hagen, S/Sgt., Camp Maxey, Tex.
5KHV, Sims, Cpl., address unknown.
6CBX, DeWolfe, Lt., address unknown.
6NFL, Duke, Capt., Camp Callan, Cal.
6NGO, Yamachika, Pvt., Camp Hale, Colo.
6SPE, Haughs, address unknown.
6UDH, Peirson, Sgt., address unknown.
ex-7AKN, Anderson, Lt., Camp Murphy, Fla.
7EYS, Donovan, Lt., Ft. Sill, Okla.
7HNY, Dunbar, T/Sgt., Ft. Bliss, Tex.
8BPH, Wilson, Pvt., Camp Sibert, Ala.
8DDV, Garrow, S/Sgt., N. Camp Polk, La.
8NTB, Merloni, Cpl., Camp Campbell, Ky.
8QHM, Rothstein, Sgt., Ft. Bragg, N. C.
8QNZ, Reynolds, Pvt., Camp Pickett, Va.
8RMU, McGhee, S/Sgt., Salem, Ore.
8RSI, Wilkinson, Sgt., address unknown.
8RYZ, Cook, Pfc., Ft. Sill, Okla.
8TSB, Brooks, T/4, Ft. Monroe, Va.
8WBD, Trostle, Pvt., Camp Haan, Cal.
8WDU, Levy, Pvt., foreign duty.
9BIR, Roeger, T/5, Camp Beale, Cal.
9BZG, Cruse, address unknown.
9EEC, Zobec, Pvt., Camp Cooke, Cal.
9JRR, Stone, S/Sgt., foreign duty.
9JYA, Chamness, Pvt., address unknown.
9JZL, Everson, Lt., address unknown.
9LZV, Lomasney, S/Sgt., foreign duty.
9NAW, Wong, address unknown.
9NRP, Pokorny, Cpl., Madison, Wis.
9ODG, Balzart, Lt., San Francisco, Cal.
9RCT, Coyle, Pfc., address unknown.
9TEC, Herndon, Sgt., foreign duty.
9UUW, Lehto, T/5, Ft. Monroe, Va.
9VJS, Davies, S/Sgt., foreign duty.
9WMY, Howe, S/Sgt., foreign duty.
9YRD, Mantos, address unknown.

Operator's license only:

Brower, S/Sgt., College Park, Md.
Browne, Pvt., Ft. Jackson, S. C.
Ford, Pvt., Camp Haan, Cal.
Karney, S/Sgt., foreign duty.
Knieriem, S/Sgt., address unknown.
Kuntz, Pvt., Camp Rucker, Ala.
Latham, Cpl., address unknown.
Lightfoot, Pvt., Ft. Breckenridge, Ky.
Manherts, T/Sgt., foreign duty.
Marshall, Major, foreign duty.
McGee, Sgt., Ft. Jackson, S. C.
Merber, Sgt., foreign duty.
Munch, Lt., foreign duty.
Oesterreicher, Pvt., address unknown.
Okada, T/5, Camp Savage, Minn.
Pacholik, Cpl., George Field, Ill.
Peterson, Lt., Camp Livingston, La.
Politi, Pfc., foreign duty.
Rodenbo, Pfc., Los Angeles, Cal.
Rose, Cpl., Ft. Benning, Ga.
Sendelbach, S/Sgt., New Haven, Ct.
Suchman, Pfc., foreign duty.
Sylvester, Pvt., Walla Walla, Wash.
Tisdal, Pvt., address unknown.
Tryon, Sgt., Melrose, Mass.
Watier, S/Sgt., Ft. Williams, Me.
Whitcomb, S/Sgt., Ft. Dawes, Mass.
Wolters, Capt., foreign duty.

COAST GUARD

1DMM, Watkins, CRT, address unknown.
1JHN, Law, BM1c, Bridgeport, Ct.
4BQP, Hoeper, Lt., address unknown.
5JPE, Purcell, RM2c, Galveston, Tex.
8NYE, Kiener, RM2c, New London, Ct.
8VZR, Walper, Sea2c, Atlantic City, N. J.
9QEA, Kopetzky, CPO (S), Chicago, Ill.
9RVC, Zehms, Sea2c, Groton, Ct.

Operator's license only:

Krimsky, RM3c, address unknown.

Two of our best hams and high speed operators and their contribution to the postwar world — Patricia Ann Marglin, W9—. Poppa is S/Sgt. Jim Marglin, W9THS, an instructor in radio armored force school at Ft. Knox, and Momma is Mickey Marglin, W9ZTU, first gal op in the Signal Corps. She's senior brass pounder at Ft. Knox. Congrats all around!

July 1943

This emergency rig and these men belong to the 5th Air Support Communication Squadron at Morris Field, N. C. *L. to r.* — Cpl. Robert Tierney, Sgt. J. Kling, Sgt. R. Cluley, T/Sgt. (was S/Sgt.) Walter Plunka, W1JVK, and M/Sgt. Harry Adelman, W2JLB. Kneeling in front is Sgt. (then Cpl.) E. L. Lewis, W3ALB.

NAVY—GENERAL

We know of a ham who has had about everything the Navy can offer — destroyer, tanker, seaplane tender, and now airplane. He says, "Flying in a flying boat beats tossing around in a 'tin can' all to blazes"!

1BDZ, Krueger, Ens., address unknown.
1BI, Northrop, Lt. (jg), Washington, D. C.
1CLM, Amann, RM2c, Sioux Falls, S. D.
1DFQ, Buckley, Lt., Portsmouth, N. H.
1DKY, Bessette, Sampson, N. Y.
1EWF, Dunham, Ens., address unknown.
1EWN, Hill, Lt., Rockland, Me.
1GBB, Steadman, Lt., address unknown.
1GZV, Warner, St. Louis, Mo.
1HNR, Slavinsky, Sea2c, address unknown.
1IUS, Foley, RT2c, Terminal Island, Cal.
1KVV, Worster, RE, Key West, Fla.
1LVO, Coan, AS, Sampson, N. Y.
1MAY, Guditz, ARM1c, Squantum, Mass.
1MQY, Hunter, F3c, Newport, R. I.
1MT, Matheson, Lt., Portsmouth, N. H.
1MVJ, Hoyt, Ens., Sanford, Fla.
1NAH, Hughes, AS, Sampson, N. Y.
1NAZ, Lalmond, address unknown.
1NEZ, Chaplin, RM3c, Sampson, N. Y.
1NJV, Chipman, AS, Farragut, Idaho.
1NM, McQuain, Lt., address unknown.
1NMB, LeBlanc, Sea2c, Bedford Springs, Pa.
1QB, Wilson, Lt. (jg), Washington, D. C.
1TI, Beach, Lt., address unknown.
2AFJ, Smith, Lt., Washington, D. C.
2DH, Lippincot, Cmdr., address unknown.
2FBS, Johnson, Lt., New York, N. Y.
2FUU, Clark, Lt. (jg), Norfolk, Va.
ex-2GS, Schuster, Sp(p)1c, Anacostia, D. C.
2JWM, Lawrence, Ens., address unknown.
2JYH, Vidal, Sp1c, Camp Peary, Va.
2KJI, Plaisted, Lt. Cmdr., Clinton, Okla.
2LRI, Bahr, AS, Hoboken, N. J.
2LSI, Schwenker, address unknown.
2MKN, Adrian, RM2c, Corpus Christi, Tex.
2MRE, Wicks, Lt. Cmdr., Detroit, Mich.
2NDQ, Braendle, Lt., address unknown.
2NJL, Werner, Sea2c, address unknown.
2NKA, Woerner, RM2c, Sampson, N. Y.
2NOK, Bordne, RM3c, address unknown.
2NSD, Green, RT3c, Takoma Park, D. C.
2NVQ, Verdibello, Sea2c, Sampson, N. Y.
2NZD, Tack, Lt. (jg), Sewickley, Pa.
2OFK, Klemas, BM1c, address unknown.
2OIB, Evans, RT2c, Terminal Island, Cal.
2OIJ, Ahlstedt, RT2c, New York, N. Y.
2OJJ, Little, RM2c, New York, N. Y.
2UU, Bennett, Lt. (jg), Portland, Me.
3CF, Littlepage, Lt., address unknown.
ex-3CYW, McLees, RT3c, Michigan City, Ind.
3DAF, Leahy, WO, address unknown.
3DLC, Swingle, Lt., address unknown.
3EJA, Chadick, RT1c, Norfolk, Va.
3ETT, Dulin, Lt. (jg), Washington, D. C.
3FNO, Crawford, Lt., Newport, R. I.
3HSA, Julstedt, Lt., address unknown.
3IEP, Matysek, RM1c, Ocracoke, N. C.
3JMC, George, RM, address unknown.
3JWF, Wilcox, Lt., Washington, D. C.
4CQ, Gluck, Cmdr., Charleston, S. C.
4DRZ, Haskings, Lt. (jg), Washington, D. C.
4EHD, Covar, RM1c, Washington, D. C.
4FEH, Inman, Lt., Beloit, Wis.
4FGU, Leathers, Lt., Arlington, Va.
4FMP, Binkley, RM2c, Winter Harbor, Me.
K4GXV, White, RM1c, Seawall, Me.
4GY, Brewin, Lt. (jg), Washington, D. C.
4HFN, Reinoehl, ASp2c, Olathe, Kansas.
4HOG, Mauney, Lt. (jg), Camp Peary, Va.
5ADC, Booker, RM1c, Norman, Okla.
5ARB, Smith, RM2c, Norman, Okla.
5AVL, Aikman, RT2c, address unknown.
5BPG, Pate, AS, Farragut, Idaho.
5DOM, Holland, WO, Washington, D. C.
5FEP, Inglet, RM3c, Corpus Christi, Tex.
5FMW, Steele, RM2c, Norman, Okla.
5FQL, Smith, RT2c, Algiers, La.
5FXA, Musick, RM3c, Norman, Okla.
5HLB, Smith, RM3c, Norman, Okla.
5HNW, Foster, Ens., New Orleans, La.
5HVP, Payne, RT2c, Memphis, Tenn.
ex-5IER, Eichenfeld, A/C, Lambert Field, Mo.
5IIT, Jarratt, Ens., Washington, D. C.
5INU, Hollingworth, RM1c, Miami, Fla.
5IUN, Lamb, RM2c, Corpus Christi, Tex.
5IYS, Henley, ARM2c, Memphis, Tenn.
5JBM, Long, RT3c, Algiers, La.
5JZW, Wimberley, Lt., Washington, D. C.
5KPD, Shores, RT2c, New London, Ct.
5KRP, Cate, Lt. (jg), Falls Church, Va.
5ZAV, Moffett, Lt., Washington, D. C.
6ADG, Colbert, Lt., Norfolk, Va.
6ATW, Umbraco, CRM, San Francisco, Cal.
6BXV, Alker, RM2c, Sunset Beach, Cal.
6DEP, Lynde, Lt., Washington, D. C.
6DJS, Shannon, Lt. (jg), address unknown.
6EAK, Matthews, Lt., Norfolk, Va.
6ECB, Irwin, RT2c, New London, Ct.
6EFF, Hortig, Lt. (jg), Newport, R. I.
6EHS, Dufour, Ens., Cambridge, Mass.
6FAQ, Tenhunen, Ens., address unknown.
6GUV, Roberts, address unknown.
6HFF, Sales, Lt., Staten Island, N. Y.
6HSA, Spindler, RM2c, San Francisco, Cal.
6IGB, Andrews, RE, Terminal Island, Cal.
6IOB, McClellan, Ch. Spec., Alameda, Cal.
6IPK, Frey, Lt. (jg), Ft. Schulyer, N. Y.
6JTN, Smith, San Francisco, Cal.
6KJ, Hanlon, Lt. (jg), San Francisco, Cal.
6KUA, Cullen, RT2c, Terminal Island, Cal.
6LGE, Thompson, RM2c, San Francisco, Cal.
6LJS, McQuoid, RM2c, San Diego, Cal.
6LLS, Peterson, WO, San Francisco, Cal.
6LSP, Buie, Lt., Corpus Christi, Tex.
6MCS, Herbig, CRM, San Francisco, Cal.
6MVE, Moore, RM2c, Los Angeles, Cal.
6NCM, Gearhart, RM1c, San Francisco, Cal.
6NRE, Sweetland, Ens., address unknown.
6NYZ, Wells, address unknown.
6OBU, Monroe, RM2c, Eureka, Cal.
6OCZ, Glasson, Lt. (jg), Los Angeles, Cal.
6OIZ, Garcia, RM2c, address unknown.
6PBV, Leo, RM2c, San Francisco, Cal.
6PQW, Shaklee, RM2c, address unknown.
6PUQ, Rodman, RM2c, San Francisco, Cal
6QLF, Hart, address unknown.
6QWA, Owens, CRM, San Francisco, Cal.
6QWW, Steward, Ens., address unknown.
6QWX, Matthews, Lt. (jg), Los Alametos, Cal.
6RAF, Hopsin, RT2c, address unknown.
6RHC, Dixon, address unknown.
6RPT, Gebhart, San Diego, Cal.
6RZY, Oliver, ARM2c, Norfolk, Va.
6SEP, Watson, Lt. (jg), San Diego, Cal.
KH6SHS, Petranek, ACRM, Cape May, N. J.
6SLP, Valentine, Lt., Farragut, Idaho.
6SNT, Newton, RM3c, address unknown.
6SOM, Dane, RM2c, address unknown.
6TBD, Ross, San Diego, Cal.
6TLW, Titus, RT2c, San Diego, Cal.
6TMT, Bocast, AS, address unknown.
6TYP, Child, address unknown.
6TZC, Painter, RT2c, San Diego, Cal.
6UCT, Dibble, A/C, Corpus Christi, Tex.
6UCW, Emmett, San Diego, Cal.
6UCX, Linden, Sea2c, San Diego, Cal.
6UIT, MacDonald, RM1c, Oceanside, Cal.
6URS, Hensen, San Francisco, Cal.
6USO, McReaken, RM3c, Memphis, Tenn.
7ABF, Flagler, Lt. (jg), address unknown.
7ABN, Coston, RT2c, Bremerton, Wash.
7BYK, Chambers, RM1c, address unknown.
7CKG, Spangenberger, RM2c, add. unknown.
7CRU, Apgar, Noroton Heights, Ct.
7CSE, Barina, RM1c, address unknown.
7DHC, Harmony, CQM, Seattle, Wash.
7DVA, Cook, Ens., address unknown.
7GUU, Gerdon, CRT, Seattle, Wash.
7HCR, Scofield, Sea2c, address unknown.
7HEM, Newman, RT2c, Bremerton, Wash.
7HLI, Leyde, RT1c, address unknown.
7HML, Metcalfe, RM3c, Bremerton, Wash.
K7HZM, Hynum, CRM, Seattle, Wash.
7IAP, Waddell, address unknown.
7IJK, Hansen, RM2c, Miami, Fla.
7INL, Durham, AS, Farragut, Idaho.
7IVZ, Doherty, RT3c, address unknown.
8CUP, Consterdine, RT1c, New London, Ct
8EYV, Swisher, Lt. (jg), Norman, Okla.
8GFB, Clark, RM3c, Detroit, Mich.
8IAR, Churchill, ARM2c, Detroit, Mich.
8INF, Brooker, ARM3c, Jacksonville, Fla.
8IUD, Jones, Lt., Detroit, Mich.
8KNU, Meyer, Ens., Quincy, Mass.
ex-8MXQ, Paggeot, RM3c, Detroit, Mich.
ex-8OM, Marks, RM2c, Detroit, Mich.
8OZA, Sievert, RM2c, address unknown.
8QDW, Forster, CRM, Winter Harbor, Me.
8RST, Glos, RT3c, Stillwater, Okla.
8SMC, Erhart, Sea2c, Evanston, Ill.
8SXA, DeForest, Lt. (jg), address unknown.
8TAA, Giegel, Sea2c, Great Lakes, Ill.
8TAK, Miner, AS, Great Lakes, Ill.
8UIZ, Russell, RT2c, New London, Ct.
8UJP, Wallace, RT2c, Washington, D. C.
8UTJ, Schraft, RM2c, address unknown.
8UYV, Hesse, address unknown.
8VLQ, Walker, ARM, Great Lakes, Ill.
8VNE, Higgins, AS, Sampson, N. Y.
8VUZ, Martin, RT3c, Houston, Tex.
8WTT, Dugas, ARM3c, Jacksonville, Fla.
9ABB, Hinkle, address unknown.
9ALR, Sprowls, Lt. (jg), Boston, Mass.
9AQD, Thomson, Ens., Yorktown, Va.
9CWM, Kimberly, Lt., Cambridge, Mass.
ex-9DBM, Roberts, Lt. (jg), New Orleans, La
9DUC, Reedy, Ens., Washington, D. C.
9DYO, Smith, ARM3c, Memphis, Tenn.
9ELL, LaVielle, Lt. Cmdr., Little Creek, Va.
9FCG, Hamilton, Norfolk, Va.

9GCW, Range, RT2c, Washington, D. C.
9HJN, LaPorte, Lt. Cmdr., address unknown.
ex-9HWY, Kercher, RM1c, Norfolk, Va.
9ICL, Eagle, RT2c, Great Lakes, Ill.
9JPS, Hudzinski, ARM1c, Glenview, Ill.
9KCS, Clark, RM3c, Corpus Christi, Tex.
9KVF, Onstad, RT1c, Terminal Island, Cal.
9LIJ, Brandt, Ens., Corpus Christi, Tex.
9LMJ, Dillingham, AS, Farragut, Idaho.
ex-9LTW, Pfeifer, Cmdr., New York, N. Y.
9MKN, Teeple, Ens., address unknown.
9QDQ, Babbit, Lt., Columbus, Ohio.
9RLT, Meyers, RT2c, Michigan City, Ind.
9SUO, Young, ARM1c, Memphis, Tenn.
9TAS, Brazda, RM1c, Miami, Fla.
9VES, Simmons, RM3c, Poyners Hill, N. C.
9VIK, Haller, RM2c, Farragut, Idaho.
9VOD, Russell, Lt. Chicago, Ill.
9VWY, Williams, RM3c, St. Albans, N. Y.
9YCK, Blad, ARM1c, Pensacola, Fla.
9ZPT, Redlin, RM2c, address unknown.
9ZYL, Moorman, Lt. (jg), Hollywood, Fla.

Operator's license only:

Agar, Lt. (jg), Washington, D. C.
Friedlander, RM3c, Memphis, Tenn.
McClendon, address unknown.
Moore, AS, Sampson, N. Y.
Wintroub, RT2c, Chicago, Ill.

MERCHANT MARINE AND MARITIME SERVICE

This is the first time we have listed men in the above services. They are doing a mighty important job and we would like word on all the hams in them.

1LZR, Jeffers; 1MMG, Newbold; 1MRZ, Lindgren; 1NGL, Heibeck; 1NJI, Olivieri; ex-1SO, Dinsmore; 2AZO, Smith; 2BCU, Lewis; ex-2CSQ, Daniel; 2IX, Greer; 2JVK, Huntley; 2KCH, Wirfel; 2KPA, Deeg; 2KVZ, Burger; 2LIW, Hyder; 2LWA, Lindstrom; 2MMM, Goldberg; 2OCF, Grossman; 3GRW, Solomon; 3HTG, Meloney; 3JMV, Erdle; 4BRB, Sykes; 4DAM, Jackson; 4DGW, Tonjes; 4HPH, Antenucci; 4HXW, Stokely; 5ILN, Harton; 5JPC, Wehrli; 5KSE, Lanphere; 6OPQ, Young; 6SAN, Pauly; 6SXK, Olver; 6SXQ, Cunningham; 6TLN, Eslinger; 7HEW, Eitelberg; 7IKG, Rodgers; 7JDJ, Casebeer; ex-8ORX, Wagner; 8TWP, Wallander; 8ULH, Struze; 8UUW, White; 8VTA, Shakespeare; 8VUT, Geller; 9CEE, Heitzman; 9FAW, Smith; 9JEY, Zych; 9KWI, Fryklund; 9MJJ, Hoskins; 9MUQ, Ricker; 9NQD, Heinen; 9OEE, Albers; 9OMU, Clough; 9QMG, Fryklund; 9RSP, Wiley; 9SXV, Moore; 9TVX, Casteen; 9VQE, Beliman; 9WAP, McClement; and Edwards and Meltzer with operator's licenses only.

Stuart Meyer, ARTlc, W2GHK, is an instructor in aviation radio matériel at the Naval Air Technical Training Center in Corpus Christi, Tex. That would be the place for a "CQ" and a "HI", wouldn't it?

CANADA

This is more like it! A couple of nice long lists and a picture have been received between issues, and our VE Roster is now assuming satisfactory proportions. Please keep the information coming — and make it as complete as possible, so we can list rank or rating and not just "address unknown." If you are on foreign duty and wish your address kept confidential, please tell us and it will not appear in *QST*.

RCA

1AL, Crowell, Sydney, N. S.
1BK, Rowe, foreign duty.
1IH, Mills, foreign duty.
1MA, Bath, address unknown.
1OG, Mosher, foreign duty.
2AR, Thornton, Lt., foreign duty.
3AHL, Sears, address unknown.
3YQ, Robbins, Camp Borden, Ont.
4AFE, Forster, address unknown.
4AFV, Elliott, address unknown.
4AIP, Peat, Lt., address unknown.
4AKH, Lane, foreign duty.
4ALD, Taft, address unknown.
4BP, Doughty, Fus., Edmonton, Alta.
4BW, Sacker, Lt., Edmonton, Alta.
4HT, Sterling, Lt., Edmonton, Alta.
4JP, Elliott, L/C, Alliance, Alta.
4LG, Bryant, Capt., Vancouver Island, B. C.
4LQ, Butchart, Lt., Edmonton, Alta.
4OG, Reagh, Capt., foreign duty.
4QL, Wilkinson, Sgmn., Edmonton, Alta.
4XF, Sullivan, Sgt., Edmonton, Alta.
5FG, Hocking, Capt., Vancouver, B. C.

RCCS

ex-1AQ, Bernasconi, Gaspé, Que.
1HF, Taylor, Halifax, N. S.
1MZ, Hart, Halifax, N. S.
ex-2FD, Taylor, Capt., foreign duty.
3AHB, Merritt, Sgt., address unknown.
3AMY, Holloway, address unknown.
3UX, Sisley, Sgt., Toronto, Ont.
4AAD, Freeman, Capt., Calgary, Alta.
4ACF, Heseltine, Sgmn., Kingston, Ont.
4AEA, Horton, Sgmn., Kingston, Ont.
4AHY, Runnalls, Sgt., Ottawa, Ont.
4AOT, Hicks, Sgmn., foreign duty.
4ATI, Anderson, S/Sgt, foreign duty.
4ATJ, Currie, foreign duty.
4CY, Lichinsky, 2nd Lt., Calgary, Alta.
4GD, Smalley, Sgt., Calgary, Alta.
4HY, Hyde, Sgt., foreign duty.
4SQ, Epp, Lt., foreign duty.
5EP, Vaughn-Smith, S/Sgt., Vancouver Island, B. C.

RCAF

1AX, Arthur, address unknown.
1CK, Gammon, address unknown.
1CP, Burton, address unknown.
1ER, Redden, address unknown.
1HK, Dowden, address unknown.
1KH, Leonard, address unknown.
1LZ, Bain, Scouduc, N. B.
1NV, Warner, foreign duty.
1OO, Harris, foreign duty.
2BO, Field, F/O, foreign duty.
2EN, Hutchinson, address unknown.
2IC, Lymburner, Montreal, Que.
2LV, Chapman, F/O, foreign duty.
3AAI, Sweet, address unknown.
3AAS, Barrie, address unknown.
3ABZ, Taylor, Toronto, Ont.
3AD, Michael, British Columbia.
3AEK, Voege, address unknown.
3AFW, Dike, F/Sgt., Vancouver, B. C.
3AMP, Cook, Cpl., Simcoe, Ont.
3ANQ, Farr, Brandon, Man.
3AOA, Loveys, Cpl., address unknown.
3ART, Ryerse, Sgt., foreign duty.
3AWC, Crichton, Cpl., foreign duty.

To our way of thinking, this Canadian ham rates a rest on the sill. Cpl. Jack Cook, VE3AMP, is home in Simcoe, Ont., after two and a half years active service with the RCAF. He's met hams in all sorts of places!

3AWN, Sovereign, Cpl., foreign duty.
3AWX, Mendham, Sgt., Toronto, Ont.
3AXO, Oliver, Cpl., foreign duty.
3EF, Gunn, Halifax, N. S.
3FB, Sangster, F/O, Toronto, Ont.
3IC, Martin, F/O, address unknown.
3JN, Richardson, F/Sgt., address unknown.
3JP, Laing, British Columbia.
3OJ, Poole, Sqdn. Ldr., address unknown.
3SS, Kufluk, F/Lt., Winnipeg, Man.
3TY, Heagle, address unknown.
3YB, Montmorency, foreign duty.
4ADP, Wilson, Shelburne, N. S.
4AET, Foster, LAC, foreign duty.
4AEV, Lockhart, AC2, Calgary, Alta.
4AFX, Menard, foreign duty.
4AFY, Shopka, foreign duty.
4AGZ, Stewart, P/O, foreign duty.
4ALH, Noss, address unknown.
4ASE, Williams, foreign duty.
4BJ, Duncan, LAC, Winnipeg, Man.
4DO, Williams, foreign duty.
4GM, Roberts, F/Lt., address unknown.
4IF, Elliott, Sqdn. Ldr., foreign duty.
4IN, Lawrie, Vancouver Island, B. C.
4OE, Nielsen, Sgt., Halifax, N. S.
4ON, Hutton, Wing Cmdr., Ottawa, Ont.
4OZ, Reid, foreign duty.
4UT, Crawley, P/O, Edmonton, Alta.
4YD, Fair, foreign duty.
5AEB, Matthews, F/Sgt., Edmonton, Alta.
5CO, Bunting, address unknown.

RCN

1CD, Harrison, address unknown.
1EV, Brown, Halifax, N. S.
1FB, Roue, foreign duty.
1IQ, Hanrahan, Ottawa, Ont.
1JS, Kenny, foreign duty.
1KB, Scott, Halifax, N. S.
1KG, Phelan, Halifax, N. S.
1LP, Hickey, address unknown.
1NP, Robinson, L/Tel., Halifax, N. S.
2EX, Warr, Lt., Ottawa, Ont.
2FN, New, Lt., Ottawa, Ont.
2JS, Argyle, Lt. Cmdr., Ottawa, Ont.
2OB, Mercer, Lt., Ottawa, Ont.
3AJU, Mason, Lt., address unknown.
3GC, Ruth, Ottawa, Ont.
3MP, Wale, address unknown.
3PD, Edwards, Gaspe, Que.
4ADX, Cuff, Esquimalt, B. C.
4AIH, Shideler, address unknown.
4AQG, McLaughlin, Lt., address unknown.
4GC, Strong, Lt., Ottawa, Ont.
4RP, White, address unknown.
5PW, Ramsay, Sub-Lt., Ottawa, Ont.

RAF

1BB, Fougere, foreign duty.
3AAS, Barry, Cpl., foreign duty.
3KT, Holmes, foreign duty.

A 250-Watt C.W. Transmitter Using Receiving-Type Tubes

6L6Gs in a Simple Two-Stage Rig

BY B. C. BARBEE,* W2MWX

This article might more appropriately be titled, "Sentencing the 6L6 to Hard Labor," for Gestapo Chief Barbee makes a pair of them sweat to the tune of better than 250 watts. Even if you shudder at such inhumane treatment, you may find this rig, free of frills but built for maximum performance, the sort you'll want to have on tap "in the year V."

SINCE W2MWX (and also W5FPJ, which preceded) always had to be operated on limited means, all transmitters have been built around receiving-type tubes as a matter of necessity. All of these tubes, which have ranged from 199s to the more modern 6L6Gs, have been listed in receiving-tube manuals, although we think those who wrote the manuals would gasp in horror at the way their carefully specified ratings have been treated. To get real high power from the pair of 6L6Gs in the final of this rig, the plate voltage was boosted to 1125 volts! With a little intelligent handling, however, they'll take it and like it.

The circuit diagram of the r.f. section appears in Fig. 1. It consists simply of a 6L6G oscillator driving a pair of 6L6Gs in push-pull. The crystal oscillator is of the regenerative type. Its plate circuit may be tuned either to the fundamental or to the second harmonic of the crystal frequency. This stage, which is link-coupled to the amplifier, operates from a separate 400-volt power-supply section. Screen voltage is obtained through a simple series dropping resistor, R_4, and the key is placed in the oscillator cathode circuit to permit break-in operation.

* 109 Hammond St., Cambridge, Mass.

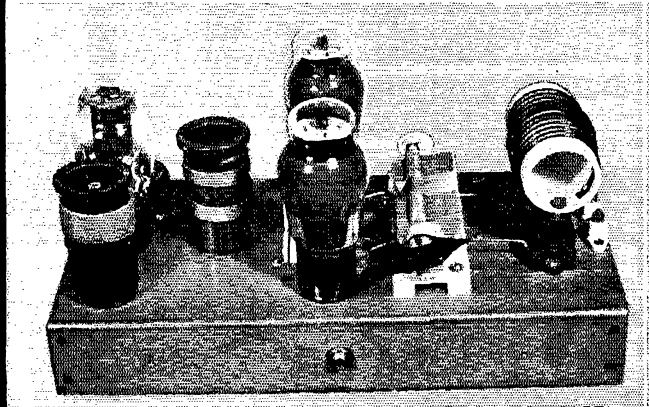
The amplifier is neutralized by means of the condensers, C_5 and C_6. The rotor of the plate tank condenser is grounded for protection to the operator. So long as the amplifier is loaded with an antenna or dummy load, no arcing will occur, even at voltages as high as 1100 or more. Screen voltage for the amplifier is taken from the 400-volt power-supply section supplying the plate of the oscillator. Since the amplifier is not keyed, a combination of grid-leak and battery bias is employed. 6L6Gs were used rather than metal 6L6s because of their ability to run cooler, their better insulation and because visibility of the elements was considered essential, since the plates of the amplifier tubes run slightly red on long dashes.

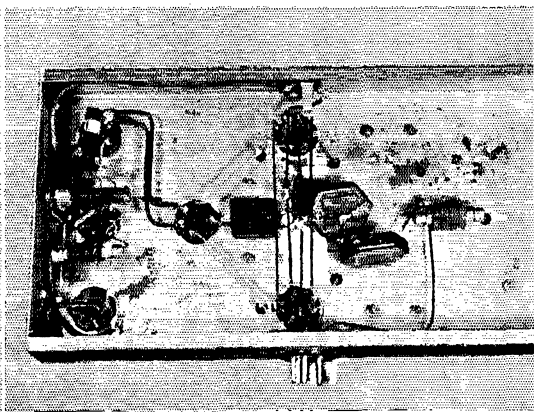
Because we never were favored with an abundance of crystals, construction was simplified by eliminating formal tuning controls for the oscillator-plate and amplifier-grid tank circuits. The tuning condensers, C_4 and C_7, are Hammarlund APC trimmers mounted inside the coil forms. They can be adjusted with a screwdriver in case an appreciable change in crystal frequency is made. A low-impedance output winding is provided, but a matching network may be used to feed any type of antenna.

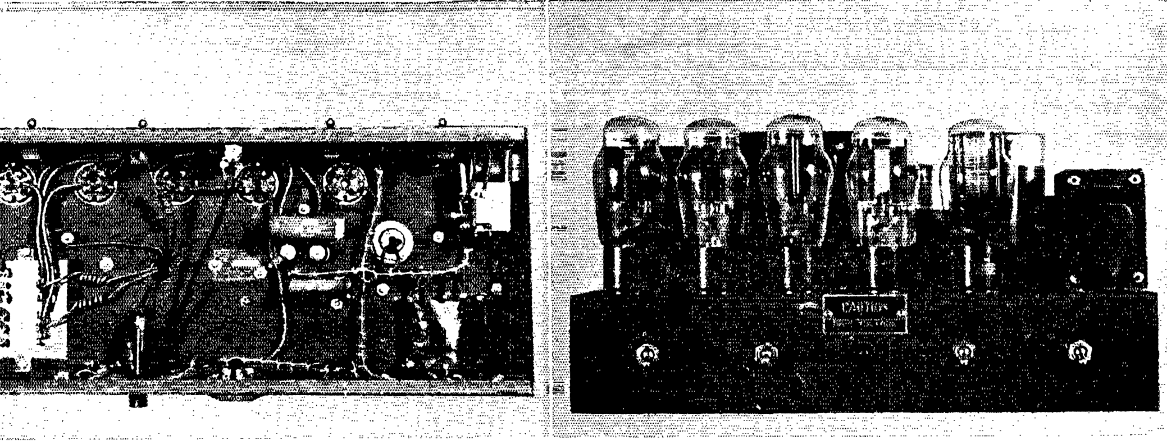
Construction

The r.f. section is built on a 7 × 11 × 2-inch chassis. All sockets are mounted below the chassis. Those for the crystal, oscillator tube and oscillator plate tank coil, L_1, are placed in line at the left-hand end of the chassis. The socket for the amplifier grid coil is mounted to the right of the oscillator tube. Next come the amplifier tubes, with the neutralizing condensers mounted between them on small stand-off insulators. The amplifier-tank tuning condenser and coil are

Left — The 250-watt c.w. transmitter looks simple enough. The crystal is behind the oscillator tube at the left, while the neutralizing condensers are between the two amplifier tubes. The jack in front is for the key. *Right* — Bottom view of the r.f. unit, showing the by-pass condensers, resistors, r.f. chokes and much of the r.f. wiring.







Left — Bottom view of the power-supply unit. The relay is in the upper right-hand corner. *Right* — The rectifier tubes are lined up along the front edge of the power-supply chassis, with transformers and filter equipment behind.

placed side by side at the right-hand end. Leads to the neutralizing condensers are brought up through large clearance holes in the chassis. All by-pass condensers, resistors and r.f. chokes are mounted underneath the chassis. The jack at the front is for the key.

All coils, except the output tank coil, are wound on Hammarlund 1½-inch diameter plug-in forms. As mentioned previously, tuning condensers for the oscillator plate and amplifier grid are mounted within the forms. The amplifier plate coils are wound on National XR-13 forms which are 1¾ inches in diameter. These coils plug into Type XB-5 sockets. While the transmitter was designed primarily for operation only in the 14- and 7-Mc. bands, it should work on lower frequencies as well.

The power supply is quite conventional. The circuit diagram is shown in Fig. 2. A 5Z3 is used in a full-wave 400-volt condenser-input supply for the oscillator plate and screen and the final-amplifier screens. Four 83s in a bridge circuit, with swinging-choke input, supply the demands of the amplifier plates. The output voltage is about 1125 under full load. A switch is provided to change to half voltage for tuning up. Interlocking switches prevent turning on the high voltage without first turning on the filaments, although no time delay is provided. The high-voltage plate transformer is controlled in its primary by a relay, R_y, which also controls the low-voltage supply in its center tap and is operated from the 6.3-volt heater winding of the low-voltage transformer. It might seem that the transformer's ratings would be somewhat exceeded, but no trouble has been experienced in intermittently keyed service.

No meters were used except for preliminary tests, and even then flashlight bulbs or dial

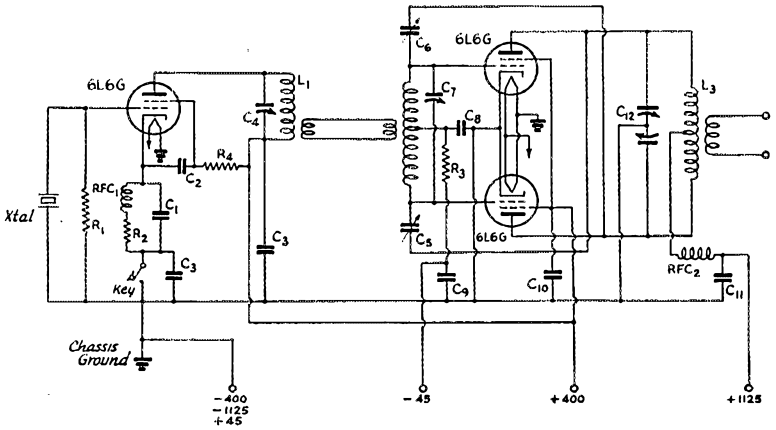


Fig. 1 — Circuit diagram of W2MWX's 250-watt transmitter.

C_1 — 250 $\mu\mu$fd. mica.
C_2, C_3, C_8, C_9, C_{10} — 0.002 μfd. mica.
C_4, C_7 — 50-$\mu\mu$fd. variable (Hammarlund type APC).
C_5, C_6 — Neutralizing condensers for 6L6.
C_{11} — 0.002 μfd. mica, 2500-volt.
C_{12} — 50 $\mu\mu$fd. per section variable, 0.06-inch plate spacing.
R_1 — 100,000 ohms, ½ watt.
R_2 — 250 ohms, 1 watt.
R_3 — 5000 ohms, 2 watts.
R_4 — 25,000 ohms, 10 watts, wire-wound.
RFC_1 — 2.5-mh., 125-ma. r.f. choke.
RFC_2 — 1-mh., 250-ma. r.f. choke.
L_1, L_2* — 20 turns No. 18, 1½-inch diameter, 1½ inches long for 7 Mc.
12 turns No. 18, 1½-inch diameter, 1½ inches long for 14 Mc.
L_3* — 28 turns No. 18, 1¾-inch diameter, 2 inches long for 7 Mc.
14 turns No. 18, 1¾-inch diameter, 2 inches long for 14 Mc.
* Centertapped.

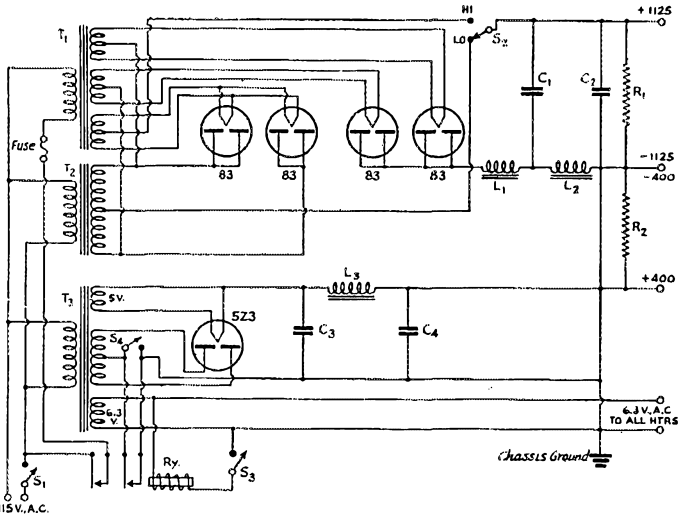


Fig. 2 — Circuit diagrams of the high- and low-voltage power supplies for the high-power receiving-tube transmitter.

C_1, C_2 — 2 μfd., 1500 volt, oil-filled.
C_3, C_4 — 8 μfd., 450-volt electrolytic.
R_1 — 50,000 ohms, 25 watts.
R_2 — 25,000 ohms, 10 watts.
Ry — Double-pole relay for 6-volt a.c. operation.
L_1 — 5-20-hy. 250-ma. swinging choke.
L_2 — 20-hy. 250-ma. smoothing choke.
S_1, S_3, S_4 — S.p.s.t. toggle switch.
S_2 — S.p.d.t. toggle switch.
T_1 — 5 volts, 3 amp.; 5 volts, 3 amp.; 5 volts, 6 amp.
T_2 — 600-0-600 volts, 200 ma. or more.
T_3 — 400-0-400 volts, 100 ma.; 5 volts, 3 amp.; 6.3 volts, 3 amp.

lamps might be substituted.[1] Plugging a meter or lamp into the key jack measures the oscillator cathode current. Hooking a similar indicator in series with the 45-volt bias battery measures the amplifier grid current, while one in series with the high-voltage lead reads the amplifier plate current. Until the amplifier is neutralized, screen and plate voltages should not be applied. This will mean disconnecting the screen lead to the amplifier, and it therefore might be well to provide a separate terminal for amplifier screen voltage.

Tuning

The oscillator is first tuned up in the usual manner, watching for the dip in cathode current which indicates resonance. C_7 should then be tuned for maximum amplifier-grid current. If a grid milliammeter is used, its reading may be used for indicating neutralization, adjusting the neutralizing condensers until turning C_{12} through its range shows no flicker in grid current. If a lamp is used to check grid current, the neon-bulb method in the plate circuit may be used, adjusting the neutralizing condensers bit by bit until there is no indication of r.f. in the plate circuit when C_{12} is tuned through resonance. Tuning of the amplifier should always be done at low plate voltage. After the amplifier plate circuit has been tuned to resonance and loaded, the voltage may then be increased. When operating at the higher plate voltages the key should not be held closed for longer periods than necessary.

When correctly tuned and fully loaded this rig operated at a final-stage input of 1125 volts at 233 ma., a power of 262.5 watts. Working into a 100-watt light bulb as a dummy load, it would have burned out the bulb had not the writer turned it off before he became blind! The bulb seemed to be about twice its normal brilliance. Of course, not everyone will want to run the tubes at maximum voltage; in fact, it may be necessary to select matched tubes which will stand up under the highest voltages.

Naturally, it is impossible to modulate the transmitter for 'phone operation under maximum-input conditions; even if continuous operation didn't eventually ruin the 6L6Gs, the peak voltages generated would. However, it is possible to use series modulation with the same power supply but only about one-fourth the power input.

In its time, with this rig we worked W1, 2, 3, 4, 5, 6, 8, 9 and K4 during one week, and when the ban on ham radio is once more lifted, it will be standing by.

[1] Sutter. "What, No Meters?" *QST*, October, 1938.

Rebuilding TR-4s

(Continued from page 18)

easier to solder this connection to the coil before the coil has been soldered in place.

Because of the additional shunt capacity imposed by the higher interelectrode capacity of the 6J5, we found that the tuning condenser would not cover the band. To increase the range of the condenser so it would cover the band, the rotor plate of the condenser was carefully bent toward the stator. This increases the maximum capacity without appreciably affecting the minimum capacity. The circuit may then be adjusted to center the band by altering the spacing of the turns in the coil, spreading the turns farther apart if the frequency range is too low or pinching them together if the range is too high. In this particular job, we ended up with the turns spaced slightly less than the diameter of the wire.

Checks of the revamped unit against a set equipped with the HY tubes showed that about 75 per cent of normal power output may be expected. With the value of grid-leak resistance recommended, plate current runs about 75 ma. at 300 volts. So far as could be determined in listening tests, receiver performance is almost on a par with the set using the HY615.

U.S.A. CALLING!

ENGINEERS AND PHYSICISTS

THE only opportunities we know about this month for commissions in the military services call for engineers and physicists. Plenty of opportunities remain for them to step direct from civil life into a uniform, because they have been officially declared to be "scarce"; but for most other categories of radio people the only present route to a commission is via the draft and an OCS.

The Signal Corps has pressing need for graduate radio engineers and electronic physicists between the ages of 22 and 45, and for graduate electrical engineers who have reached the age of 35. For full particulars, get in touch with the nearest office of the Officer Procurement Service, a list of whose addresses and telephone numbers we published on page 27 of our May issue.

In this department for many months we have made vague references to intriguing opportunities in the field of secret radio devices of a new and startling character involving profound new developments in microwave technique. We hope that you all knew that we were talking about radar, a word which for many months we were not permitted to print. Army, Navy and OWI have now issued carefully worded releases which tell a minimum about the subject, but which do restore the word to currency and which do establish that radar is a remarkably useful device for detecting the direction and range of enemy craft by virtue of their reflection of focussed beams of v.h.f. waves. It is, of course, a new technique with the greatest possible appeal to the imagination of the amateur. For this service, young graduate engineers are eagerly sought by all branches of the forces. Amateur experience helps a lot. All the services maintain special schools where advanced training is given in the application of the new technique to the particular problems of that arm, and it is worth mentioning that the schooling and experience thus obtained give one an admirable preparation for the inevitable post-war commercial applications of obstacle detection.

George W. Bailey (W1KH, ARRL President) at the Office of Scientific Research & Development, 2101 Constitution Ave., N. W., Washington, D. C., deals with the selection of Army personnel for this purpose — the Electronics Training Group of the Signal Corps. Candidates for a commission in this service must be graduates of an accredited college, either in electrical engineering or in science with an electronic-physics major, and be between the ages of 18 and 35, and in combat physical condition. Mr. Bailey will be glad to exchange full information with qualified applicants, or to advise those in doubt.

The officers in this service in the Navy are called Aviation Volunteers (Specialists). They must be graduate electrical engineers, between the ages of 18 and 45 (not 25, as we said last month). Information on this service (and on the CV-S and the EV-S classes) may be had from The Commandant of your Naval District — or Mr. Bailey will be glad to advise.

As you can imagine, the Marine Corps is making vigorous use of radar in its Aircraft Warning Service, both ground and air-borne. Their candidates must be graduate engineers between the ages of 20 and 45, and for particulars should address The Commandant, Headquarters, U. S. Marine Corps, Washington.

There are also opportunities in civilian status for engineers and physicists of the highest qualifications, capable of performing important work in the technical leadership of this war. It is believed that there are numerous professional men of this category who are seeking to make a more important use of their talents in the defense of our cause, and who would like an opportunity to explore the possibilities quietly by means of entirely confidential correspondence. As mentioned in this column the last several months, precisely such a mechanism has been set up. Those interested in pursuing the matter are invited to write under personal cover to Mr. Bailey at the aforementioned address.

WOMEN WANTED

WOMEN high-school graduates are being enrolled for summer courses in engineering, science, management and war training in over a thousand cities. Tuition-free ESMWT training courses, running from ten to sixteen weeks, are given in many techniques where women of college-level training are needed. In many cities, courses will be given in communications subjects, including not only the principles of radio but preparing for positions as Engineering Aid (Radio), Pre-Electronic Instructor and Inspector of Navy Matériel. Applications for enrollment are received at the major colleges and universities in every state, and the U. S. Office of Education at Washington will send upon request a list of institutions where the courses are given, both on the campus and through extension facilities.

The women's auxiliaries of the armed forces — WAACs, WAVES, SPARS and Marines — are still enrolling, still giving valuable training which permits a woman to release a man for field combat. Special schools are maintained; better-qualified candidates have an opportunity for commission. While the women's auxiliaries engage in many fields, we speak particularly of communications. Many of the enlisted women receive splen-

did training in radio code and others are schooled in teletypewriter operation, or the maintenance of radio gear, or the installation of telephone switchboards, and so on. Requirements and privileges vary slightly from service to service. For particulars, investigate at your local recruiting offices of the Army and Navy.

The Civil Service is keenly interested in women to serve as technical and scientific aids in government laboratories, chiefly in Washington. Details are to be found in announcements at the Civil Service office at your post office.

RADIO OPERATORS

BRASSPOUNDING in the U. S. Maritime Service is one of the most important contributions that an amateur can make. A splendid training course at a crack school remedies any deficiencies in knowledge and turns out operators who are fully qualified to give excellent account of themselves, both in war and peace. See "QST Returns to Gallups Island" in our May issue. Details of this training and opportunity from the local office of the U. S. Maritime Service, or address The Commandant thereof, Washington, D. C.

There are jobs for radio operators in many a government agency, the employment being handled by the Civil Service. Details, both of the required qualifications and of the opportunities, are to be found in CS announcements at your local post office.

Amateurs who can lend a hand in assisting broadcast stations in their manpower shortage are requested to register name, age, experience, preferred location, time available, salary desired and other pertinent data with Howard S. Frazier, director of engineering, National Association of Broadcasters, 1760 N. St., N. W., Washington.

Strays

W6CRZ, L. W. Lockwood, of Compton, Calif., whose name was listed in Silent Keys in the December issue, writes that "the report is greatly exaggerated." He is very much alive, and we are happy to make the correction.

P.O.W.

VK2HZ, M. W. Moore, of Lindfield, N. S. W., and VK3HY, Maj. H. Lyle Andrews, AAMC, of Murchison, Vict., are reported to be held as prisoners of war.

Missing in Action

VE2JT, P. O. Lawrence R. Montgomery, RCAF, of Lachine, P. Q., has been reported missing in action.

★ BOOK REVIEWS ★

Communication Circuits, by Lawrence A. Ware and Henry R. Reed. Published by John Wiley & Son, Inc., New York. 287 pages, 6 × 9, illustrated. Price, $3.50.

The material treated in this volume may be divided into two broad classifications — transmission lines from the conventional circuit standpoint, and wave guides on the basis of electromagnetic field theory. It is intended for use in a first course in communication engineering, prerequisites being ordinary calculus and elementary a.c. theory.

Opening with a chapter on the determination of transmission-line characteristics, the discussion proceeds through networks and useful network theorems to the infinite line and open- and short-circuited lines. Various types of filters are treated, as is also impedance transformation, including the use of stubs. Rectangular and cylindrical wave guides for ultrahigh frequencies are the subjects of separate chapters, and there is a brief treatment of coaxial lines on the field basis. The book closes with a chapter outlining twelve experiments designed to supplement the text.

There is a rather extensive appendix, largely devoted to the advanced mathematics needed for some sections of the text: Fourier series, hyperbolic functions, Bessel functions and Maxwell's equations. This juxtaposition of text and mathematical background is a useful feature. The fact that the book is confined to circuits, to the exclusion of associated devices such as vacuum-tube amplifiers, is likewise helpful in that it eliminates duplication of material to be found in other radio-engineering volumes and thus concentrates on the subjects ordinarily not treated so extensively.

Pre-Service Course in Electricity, by William C. Shea. Published by John Wiley & Sons, Inc., New York. 275 pages, 5½ × 8½, illustrated. Price, $2.00.

This book is one of a series prepared for preinduction training in the high schools, following outlines suggested by the War Department and the Office of Education. It is a basic course in practical electricity from which, upon completion, the student may go on either to radio communication or to automotive mechanics.

Beginning with the elementary facts of magnetism and electricity, the subject matter includes cells and batteries of various types, Ohm's Law, electromagnetism, instruments, electrical work and power, electromagnetic induction, motors and rectification. The accent is on practical applications, and no mathematics beyond the simple algebraic manipulations of Ohm's Law is required. A good book for the beginner who wants simply-explained electrical background for his radio work.

Laboratory Manual in Radio, by F. E. Almstead, K. E. Davis, and G. K. Stone. Published by McGraw-Hill Book Co., Inc., New York. 139 pages, 6 × 9, illustrated; paper covers. Price, 80 cents.

Intended for use with any elementary radio text in planned courses, this book outlines thirty-six experiments based on equipment likely to be available in school laboratories or salvageable from outmoded radio receivers. The experiments in general are grouped in the following main classifications: fundamental vacuum-tube operation, oscillators, Ohm's Law, power supply, inductance and capacity in d.c. and a.c. circuits, radio receiving and transmitting circuits, and instruments. While the experiments are simple, many of them require the assembly and wiring of set-ups, a requirement designed to give familiarity in practical construction as well as observational knowledge of circuit performance. As part of the text of each experiment, forms are provided, where necessary, for recording data and plotting curves. An appendix contains a list of symbols, conversion factors, and commonly used circuit formulas.

— *G. G.*

Let's Use Our Modulators

Applying Idle Speech Equipment to Record Players

BY I. VEE IVERSEN,* W7AW

THERE are a great many of us with 'phone transmitters off the air for the duration. Rather than allow this equipment to remain idle, some of it can be made very useful during the wait until once more we can call CQ. For instance, with minor changes we can convert our modulators to phonograph amplifiers. Also, with such an amplifier attached to a b.c. tuner, the reproduction of music is much enhanced. If you have a good loudspeaker and a phonograph pick-up, what more can you wish than a chance to rebuild that unused modulator and put it to use? Your XYL or YL will very likely be in full accord and, since material is hard to get these days, making use of what we have is a good way to keep our hands in the building and rebuilding of equipment.

Usually the amateur has put his utmost into building his modulator. The result is that most ham modulators are high-quality amplifiers and, as such an amplifier is needed for good phonograph reproduction, we have most of what we need. Any good phonograph amplifier needs a volume expander, since the volume range of recordings is compressed. Radio programs carried over 'phone lines are also compressed and, since most broadcast stations carry compression still farther to give a higher average percentage of modulation, the result is a double compression in some cases. A great many of us have volume compressors built into our modulators, which may be converted so as to operate as an expander by reversing the polarity of the rectifier.

The output transformer is generally a good one, so we have good-fidelity output. It may be that we do not have any low-impedance winding on the modulation transformer, but in most cases room can be found to add a couple of turns of heavy wire, and that will most likely be plenty to drive a speaker voice coil.

The amplifier I am about to describe has been

*1210 Northern Pacific Ry. Bldg., St. Paul, Minn.

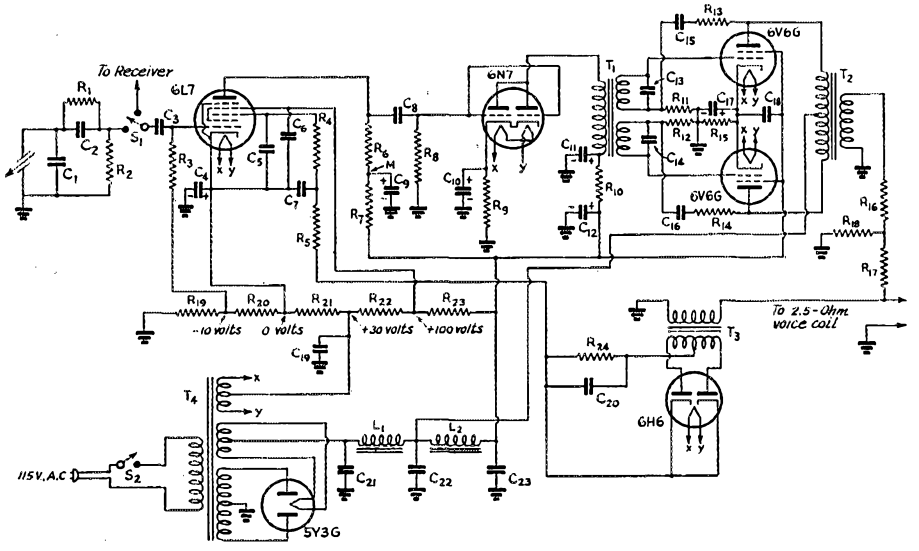


Fig. 1 — Circuit diagram showing a volume expander applied to a typical modulator system.

C_1 — See text.
C_2 — 0.001 μfd.
C_3, C_8 — 0.01 μfd.
C_4 — 25-μfd., 25-volt electrolytic.
C_5, C_6, C_7, C_{18}, C_{19}, C_{20} — 0.5 μfd.
C_9, C_{11}, C_{12}, C_{21}, C_{22}, C_{23} — 8-μfd., 450-volt electrolytic.
C_{10}, C_{17} — 50-μfd., 25-volt electrolytic.
C_{13}, C_{14} — 10 μμfd.
C_{15}, C_{16} — 0.1 μfd.
R_1 — 3 megohms.
R_2 — 5 megohms.
R_3, R_8 — 1 megohm.
R_4 — ½ megohm.
R_5 — ¼ megohm.
R_6, R_{13}, R_{14} — 0.1 megohm.
R_7, R_{10}, R_{11}, R_{12} — 10,000 ohms.
R_9 — 900 ohms.
R_{15} — 250 ohms.
R_{16}, R_{17} — 1 ohm.
R_{18} — 1.5 ohms.
R_{19} — 3000-ohm potentiometer.
R_{20} — 3000 ohms.
R_{21} — 5000 ohms.
R_{22}, R_{23} — 50,000 ohms.
R_{24} — 0.3 megohm.
L_1, L_2 — Filter chokes (Inca type D2).
T_1 — Input transformer (Inca type GH32).
T_2 — Output transformer (Inca type GH41).
T_3 — Input transformer (Inca type G26, see text).
T_4 — Power transformer, 350-0-350 volts, 150 ma.; 5 volts, 3 amperes; 6.3 volts, 4 amperes.

in use here for some time, and has given a very good account of itself. I have used it both for reproducing phonograph records and as the regular amplifier for my broadcast receiver. A great many of you can duplicate this amplifier, or can build one along similar lines with such material as you have on hand.

The circuit diagram is shown in Fig. 1. There are some ideas here that are not generally found in amateur practice, so I shall start with the pick-up and take up any unusual points as we reach them.

A crystal pick-up is used and, since this type is capacitive in its operation, you will notice that the pick-up is shunted by a condenser. "But that condenser will cut the highs," I can hear you say. The answer is that, when a capacitive generator is shunted with a condenser, all that happens is that the voltage output of that generator is reduced. Since a crystal pick-up will deliver voltages on the order of 10 volts or more from some phonograph records, we want to keep that peak value down — in this case, not to exceed 1 volt. We might limit the peak level with a volume control at the input of the first tube, but in that way we would cut the frequency response of the pick-up. So let's just let it run wide open and reduce the voltage output of the pick-up. You can add mica condensers across the pick-up, as indicated by C_1, until the heaviest recording you have does not overload the input-tube grid. The 0.001-μfd. condenser, C_2, shunted across the 3-megohm resistor, R_1, forms a network to correct the frequency response of the crystal pick-up.

The load resistor for the pick-up, R_3, can be anything from 0.5 megohm to 5 megohms; the higher the value the better the response. For all practical purposes, however, the 0.5-megohm value will be satisfactory. The signal voltage developed across this load resistor is fed to the grid of the first tube through a single-pole double-throw switch, S_1, which connects either to the output of the diode detector in a radio receiver or to the crystal pick-up. The input circuit is coupled to the first tube through a 0.01-μfd. mica condenser.

In the first stage, I have used a 6L7 as combined amplifier and volume-expansion tube. The No. 1 grid is the signal grid and the No. 2 grid is the expansion-control grid. As the value of negative voltage on the latter determines the amplification factor of the tube, I have used this for controlling volume as well as for the automatic-expansion feature. This is accomplished by using a 3000-ohm wire-wound potentiometer, R_{19}, at the bottom of the voltage-divider network. You will notice that bias for the 6L7 is taken from this same voltage-divider network. Correct voltages at the various taps are noted on the diagram. Notice that most of the voltages given are with respect to the 6L7 cathode and not to ground or chassis. I might say here that a plate current of 0.15 to 0.2 ma. has been found best for the no-signal value for the 6L7. A 0-1-ma. meter may be connected in the plate circuit of the 6L7. If used, it should be placed at the lower end of the 100,000-ohm plate resistor, R_6, at the point marked M. The plate current can be varied with the control from 0 to 0.5 milliamperes for no-signal value. Under expander operation, this no-signal value will about double for heavy passages. An expansion greater than this is entirely too much, but if the rectified voltage delivered from the 6H6 is adjusted so that the plate current is not more than doubled for a peak value of expansion, it will be found to give very pleasing results. You will find that about 1 volt is the peak value that can be applied to the signal grid of the 6L7 without encountering distortion, so you must keep the input voltage down to that value.

All by-pass condensers are returned to the cathode of the 6L7 and not to ground. It is important to keep this in mind when wiring up this stage.

You will notice that the center-tap of the heater winding on the power transformer is connected to a point 30 volts positive with respect to the cathode of the 6L7. This was necessary to eliminate hum voltage developed in the 6L7 when the heaters were grounded. There are several tube types which may develop this type of hum trouble, which is caused by the construction of the heater and cathode assembly. The heater emits electrons, and if these electrons reach the cathode conducting surface they flow back to ground through the cathode circuit and set up an a.c. hum voltage. Such a voltage results when the cathode is positive with respect to the grounded heater. If the heater is made sufficiently positive with respect to the cathode, however, no electrons will be able to flow to ground through that path because the cathode will be negative and will not attract the electrons. By that method a sometimes impossible-to-cure hum can be stopped.

The circuit of the 6N7 stage is not unusual, so nothing need be said about it.

If you have a split-secondary driver transformer, you will be able to use inverse feedback as shown to improve response and reduce hum.

If you take a modulation-transformer secondary of, say, 10,000 ohms, you can sometimes feed this successfully straight into the primary of an ordinary speaker output transformer designed for operation with pentode tubes, but it is better if the voice coil can be fed directly from the amplifier output transformer. You will notice that the speaker voice coil is shunted by the primary of a transformer, T_3. This transformer was designed for use between a 6A6 Class-A driver and 6A6 Class-B grids. The secondary is connected to the 6H6 to give rectified voltage for operation of expander system by varying the voltage on the No. 2 grid of the 6L7. I found this method of obtaining the expansion voltage better than the system often used in which the voltage is taken from the input circuit of the amplifier. It is simpler to control and needs fewer tubes.

In Class-B or AB operation, the output at low audio levels is not always all that may be desired. If the volume is increased, however, the tone

(*Continued on page 72*)

★ HAMDOM ★

On the production front and on the war fronts, in operating and in technical work — that's where Hamdom is these days. Pictured on this page is a representative collection of hams recently in the news in connection with various phases of war activity.

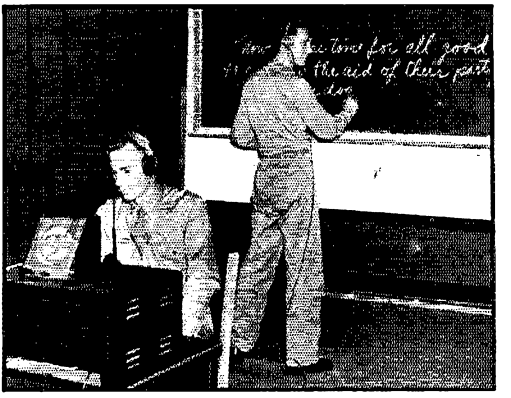
◆

President Roosevelt personally presented Edwin C. Tracy (below), ex-W1APJ, with the War Production Board's "Citation of Individual Production Merit" in recognition of his outstanding contribution aiding the industrial war effort. A field installation and service engineer with RCA Victor, ex-W1APJ skillfully applied his amateur experience in the development of apparatus for testing radio equipment for bombing planes. His suggestion, involving the use of a special oscillator about which no details have been released, cut the required testing time from eight hours to three minutes!

Ed Tracy's is just the sort of performance we at ARRL Hq might have expected from him — as from many another ham. A resident of suburban Hartford most of his life up to 1940, we saw a lot of him at local ham gatherings and on the air. It was in 1929 when he received his first ham ticket and the call W1APJ, in which year he also graduated from William Hall High School in West Hartford. Several years later he left for Pratt Institute in Brooklyn, taking a course in industrial and electrical engineering. He graduated in 1938, having been class president in both '36 and '38. At various times he has worked for such firms as Hammarlund Mfg. Co., Fairchild Aerial Camera Co. and Hartford Electrical Supply Co. In 1939 he became an employee of RCA, beginning in their Service Department.

Behind Ed Tracy's commercial record lies a dozen years of intensive amateur activity. Primarily a u.h.f. man — he was an early member of the historic Horsetraders, pioneer Connecticut Valley 56-Mc. Net — he also found time for general operating, including regular AARS activity. Organizational work in the Hartford County Amateur Radio Club occupied some of his time, too, but primarily he was an experimenter, always tinkering with gear — usually v.h.f. Shortly before leaving Hartford he became interested in television, and the post-war renaissance may find him active again in that field.

A production hero, Ed Tracy has received the highest award given on the home front. In a sense it is an award to amateur radio, as well.



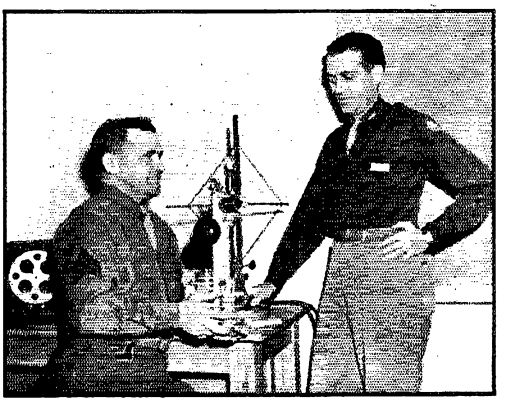
When the Army Air Forces Pre-Flight School (Pilot) at Maxwell Field, Ala., staged a code demonstration for the benefit of the school personnel, it was only logical that the feature attraction of the show should be two hams who could handle a bug in a snappy manner. The photograph above shows Aviation Cadet A. H. Macomber, W1DDB, at the key, sending at about 25 w.p.m., while Lt. H. I. Furst, W6PHA, demonstrates correct copying technique on the blackboard. Later W1DDB sent short sentences submitted by the AAF student pilots present at about 45 w.p.m., which W6PHA copied in his head and called back to the audience.

Both Lt. Furst (a former West Coast amateur champ at 69.2 w.p.m.) and Cadet Macomber gave the pre-flight students an idea of how much practice it took for them to attain their code proficiency. And what better way to acquire it than through amateur radio!

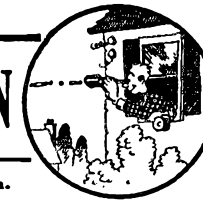
◆

When the ground school at Majors Army Air Field, Texas, needed a means of demonstrating loop-antenna direction finders, with typical ham ingenuity Lt. McDonald Gray, W9FLW, and Sgt. H. M. Crawford, W5JQN, produced the "junk-box special" with which they are pictured below. "We just picked up a board and started screwing things on it," is the way W9FLW explained the process to the Majors Field Public Relations Office.

What was needed was a fully portable transmitter, so they started with one section of a 1J6G dual triode as a c.w. oscillator. Since d/f receivers have no beat oscillators, the second 1J6G section was hooked up as an audio oscillator plate-modulating the r.f. unit. Even with loop modulation from a microphone and no antenna, the gadget works over a range of several hundred yards. Hidden around the school building, the students locate the transmitter by triangulation, gaining practice in d/f technique.



EXPERIMENTER'S SECTION



Address correspondence and reports to ARRL, West Hartford, Conn.

PROJECT A

Carrier Current

WORK with c.c. has been moving right along here in the San Joaquin Valley. We have two rigs in operation at the present time and at least two more under construction.

We have conducted some field checks and the results were very gratifying. A distance of five miles was covered with the greatest of ease — that is, a distance of five airline miles. I don't know how far it was by wire. An airline distance of fifteen miles was also attempted. The results in one direction were fine, but we had no luck in the opposite direction. Signals in the direction which we could work were R5 all the time, in spite of heavy line noise. It must be that the sigs were squirting in one direction.

The receiver is a conventional untuned-r.f. job with a regenerative detector and one stage of a.f. The transmitter is a 6L6 in a conventional Hartley oscillator. All operation has been on c.w., running about twelve watts input to the oscillator. The Hartley seems to be very stable; in fact, there has been no noticeable drift in frequency during the time the rig has been in operation, about two months. Both transmitters are fixed-tuned on 113.5 kc. Both receivers likewise cover the same band of frequencies, from 107 to 170 kc.

That's about all the dope here, but I'd sure like to see a few more fellows come on down. We could have some nice rag-chews. If anyone wants any dope, they can just drop me a card and we'll arrange a get-together and talk it over. — *Al Weber, W6RLJ, 704 Woodrow Ave., Oildale, Calif.*

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In the circuit diagram of W6RLJ's transmitter-receiver for carrier current, dimensions of the transmitter tank coil, L_4, were inadvertently omitted. This coil should have 150 turns of No. 18 wire, 2¼ inches in diameter, with a tap at the 50th turn from the ground (grid) end.

—•••—

Some time back, when the first articles on carrier-current transmission were printed in *QST*, the statement was made that "the distance covered by c.c. transmissions will probably be greater in rural areas," or words to that effect. However, here are some of the things that have been observed by W9DKP and myself while carrying on QSOs over the Rural Electric Membership Corporation Lines.

For quite a while we have been having practically 100 per cent results with the exception of a couple of times when the line noise was really going to town and it was impossible to copy anything, either c.c. or long-wave commercial or Navy stations. Signals seem to be quite a bit louder at the receiving end during the daytime when the line load is not so great, except on wash day and the day after, when the XYL has the electric iron going! Turning the house lights off and on seems to have no effect on the signal strength, although it does cause a very slight change in the pitch of the received signal. When an electric iron is turned on in the same house as the transmitter, however, it takes the soup out pronto.

A couple of months ago signals were a lot better than they are now, no doubt because of the large number of electric brooders being used at this time. The brooders seem to have the same bad effect on c.c. that irons have, with the added disadvantage that they are on all the time, so it seems that we won't be able to look for any really good signals until after the chicken-raising season is over.

The airline distance between here and W9DKP is four and one-half miles and the distance via the REMC lines is approximately twelve miles, if (?) the signals follow the shortest possible route.

The receivers used are 6SK7 converters ahead of Sky Buddys, as per *QST*, and the transmitters are the old reliable Hartley oscillator circuit using a couple of 201A tubes in parallel and running from 7 to 9 watts input. We are running 250 volts on the plates of the 201As from power supplies with choke input that give fairly good regulation, and the note is right pretty to copy. Incidentally, the tubes are some that have been in the old junk box here for the last 13 years; before that they worked all U. S. and VE districts on 20 c.w. Hi! Them wuz the days!

The frequency we use mostly is 125 kc., and so far we have not tried to operate above 130 kc.

A word about the location of W9DKP and myself. We are both farmers and the houses throughout this territory average approximately three to the mile, so you can see that we do not have nearly the competition in the way of QRM from appliances that the fellows in the cities have to contend with. Nevertheless, the line noise and static are terrific at times. And I used to think we had line noise and QRN on 160! Last winter, before the noise and the electric brooders, I could put a Q5, R8–9 signal into DKP's with less than one watt input to a single 201A — but not now!

Signal strength now is usually Q5, R5–7, but this could undoubtedly be improved by an increase in power. However, after the experience of that W6 some time back we don't care to use more than the minimum power needed to put in a readable signal. — *Wilbur Keaton, W9AUN, Morristown, Indiana.*

—•••—

For the benefit of those who may be tempted to try wired wireless as per Byron Goodman in your March, 1942, issue of *QST*, it is suggested that the grid coupling condenser, C_4, be increased to 0.002 μfd. This will result in better output and higher efficiency under load, as can be understood when it is realized that the reactance of the indicated coupling condenser is about 10,000 ohms at the low frequencies being used. — *John A. Labaj, Sandusky, Ohio.*

—•••—

I have been experimenting with wired wireless for six or more months, using *QST* rigs. It works fine. According to the transmitter's harmonics, I am on 165 kc. One day, while fooling around with the antenna on my converter, the lead-in wire slipped and hooked onto the screen connection of my tube. When this happened I could hear about ten more stations than I could with the antenna connected to the input coil. One of these stations is an airplane beacon about 375 kc. Others are NSS, NAA, WSO, WGG, PG, WCF, WDE, and WSL (on 109 kc.). Most of these stations send code and number groups. Several of them seem to beat with the output frequency of the converter. I tried connecting the grid to the 115-volt line; on the ungrounded side all I got was a loud hum, but on the grounded side the results were good. Foster Reynolds (LSPH) was sending on his w.w. transmitter about three blocks away. When I connected the screen to the grounded side of the 115-volt line, I heard him about four times as strong as I did with the input method described in *QST*. Then I tried connecting the screen straight to the ground, but nothing happened at all. It only worked connected to the grounded side of the 115-volt line. My receiver had to be grounded also in order to hear him. He connected his input as just described and now we have excellent results. Maybe some of you other experimenters will want to try this. Also try to explain it; I can't!

If anyone living in this area would like to try to contact me on w.w., please drop me a card. I'll be glad to correspond with anyone interested in wired wireless. — *Roy Murray, 528 Spruce Ave., Upper Darby, Pa.*

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At this writing I have been working c.c. over the 115-volt a.c. line for a distance of approximately 10 miles, using either 'phone or c.w. with 100 per cent results, for the last 6 months. I have had QSOs too numerous to mention with WW8JRH, John Hydoin, a local telephone serviceman, who became interested in c.c. with little persuasion.

I am using a transmitter similar to the one in *QST* for March, 1942. For 'phone I use a modulator consisting of a 6F6G driven by a resistance-coupled 6J5 and a carbon mike. A UTC S-18 output transformer is used as the modulating transformer. My receiver is a Hallicrafters S20R with a converter, as per March, 1942, *QST*, and it surely works fine.

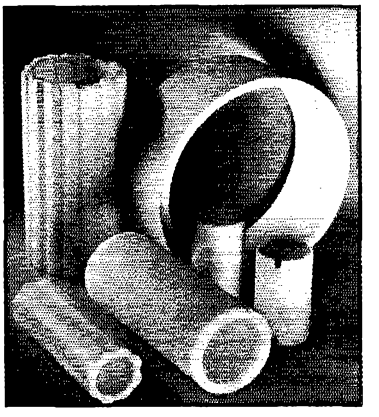
I would like to hear from anyone having any ideas as to how to operate a relay with c.c. over a 115-volt a.c. line. I'd like to turn on the receiver at WW8JRH by turning on my transmitter.

At the present time there are two other transmitters in the building which are expected to be in operation very soon. — *D. M. Decker, WW8DMD, Deckerville, Mich.*

—•••—

I have found that carrier current makes an excellent field for experimentation in radio fundamentals classes. I have revamped my former equipment, used for laboratory work on the usual amateur frequencies, to 100–200 kc. This shift, it seemed to me, would eliminate any difficulty that might arise from radiation on higher-frequency equipment. It also gives the student a chance actually to test out his experiment as no license is needed for this type of operation. The theory of operation of course fits nicely with any text, as the usual radio principles all apply except for radiation from antennas. One of my students has gained considerable technical experience by building a three-stage transmitter for carrier current and putting it into operation over a distance of two miles or more. It consisted of a 27 Hartley oscillator, a 45 buffer and parallel 45s in the final. It seems to me that this field offers a wonderful opportunity for educational use. — *Gladden Elliott, W6MLL, Nogales, Ariz.*

Strays



A new process developed by Corning Glass Works permits the fabrication to close tolerances of complicated glass forms for radio use, which hitherto have been produced only by slow and expensive methods. Forms such as those shown in the photograph can now be made of grades of glass the loss factor of which is about the same as steatite, while linear expansion with temperature is much superior. Forms of this type should be just the thing for self-excited oscillator applications. Smaller parts, such as beads and bushings, are also made.

The Life of a CAA Communications Operator

But Don't—Burp!—Get Me Wrong . . .

BY ROGER WILLCO*

As recently as a year ago, the starting pay for CAA communications operators was $1260 a year. A Class A amateur license, at least, was necessary. Touch typing at 35 w.p.m. was required. Help was plentiful. The outfit could afford to be choosey.

If women and civilians were not barred, exactly, the popular belief was that only men — ex-servicemen — could do the work. This belief was especially popular (and still is) with the ex-servicemen of which the outfit was (and still is) largely composed.

To-day, however, there are two schools of thought on the point. The gals and the civilians are in. Blame it on Hitler!

Now the only requirement is touch typing — 30 w.p.m., I believe — and it has been my experience that the examining officials are not too exacting even about this. The outfit needs help — has, indeed, implored employees to secure recruits. (How'm I doin', boss?)

Here in the CAA First Region, the new appointee goes to school (a war-time innovation) at LaGuardia Field in New York. There for three months he — or she — an American citizen aged 18 to 50, is subjected to a fast hustle in, over and through such matters as teletype, c.w., radio theory, weather and the 'phone routine used in contacting planes. The resulting 90-day marvel's salary is $1440 a year.

School completed, our new communications operator is given his choice of what positions may be open. Because of war-time expansion, there are quite a few. He may be sent to a station which observes weather only, or he may be assigned to one which, in addition, is in more or less constant communication with airplanes. Here he is, in effect, a sort of traffic cop. He is also, in a sense, a light-house keeper (watch that hyphen, Mr. Printer!), one of his duties being to monitor range, or beam, signals put out by his own and distant stations.

He "observes" local weather conditions and transmits hourly reports via teletype. In return, his teletype gives him weather reports from distant points; these he communicates via radiotelephone, in code, to pilots when requested. He relays radiotelephone messages from planes to the control tower via the interphone (a party line on which there are half a dozen stations like his own). He also reverses the process and relays the control tower's instructions to airplanes. Finally, he guards the aircraft frequencies continuously.

His salary for this work is $1620 a year (plus about 20 percent, under recent war-time legislation).

The station is probably a five-man affair, although in some cases there are more, Weather Bureau personnel being assigned to the busier spots. The chief of such a station rates $2000, the assistant $1800 — plus, again, 20 per cent.

The stations are graded in importance and size. As the operator becomes more proficient, he will move up, grade by grade as his ability warrants, to higher pay and more exacting duties.

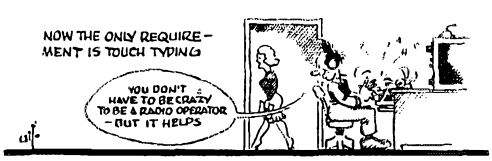
There are also opportunities in the CAA for the mechanically-minded to become radio and teletype technicians — opportunities right, it seems to me, up the alley of that Empirical Elmer, the ham. (Include me out, boss; with a soldering iron I'm strictly a menace.)

The nice shiny new operator, with his handsome Weather Bureau certificate on the station wall and credentials in his pocket affirming that "his authority will be respected" (it doesn't say by whom), stands an 8-hour watch 6 days a week. He will probably have to do quite a bit of night work, too, at first. Seniority rates here. But things move fast these days, and before long he acquires some of that valuable commodity — seniority — himself. He rates a month's annual leave.

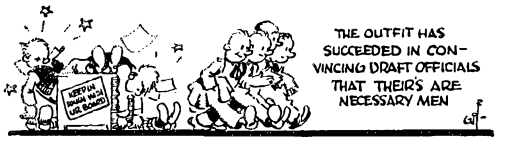
It isn't clear to this operator why such stress is laid on c.w. and theory. Perhaps it's a hangover from the past. Perhaps it's a case of building for the future. At present, however, the job actually calls for nothing more than average intelligence, a modicum of typing skill and the ability to take messages over the telephone. If you can forget the miracle of radio, the absence of wires, the fact that you are talking with a fellow perhaps two miles up in the air who is flying blind on your say-so, you might just as well be a telephone clerk in the shipping department of a sausage factory.

For those interested in telegraphy, however, there are opportunities for practice. Then, too, there *are* jobs (Alaska and the Pacific islands) where c.w. is used. You have to do 30 w.p.m. to qualify.

*See "Splatter," this issue (p. 41).



Up to now the outfit has succeeded in convincing draft officials that theirs are necessary men in necessary jobs. Single men, otherwise eligible for war service, have therefore been placed in II-B. How long this situation will hold is, of course, problematic.



It should be noted that the war service appointees — and aren't we all? — are temporary. The understanding is they will be discharged six months after the war's end. There is a feeling, however, that the expanding CAA will continue to expand after the war, and that the war babies will all be taken in off the doorstep and given a name. Could be — but don't bet on it. At even money, that is.

It should also be noted that any operator who wants out before the duration is in something of a spot. The CAA doesn't want to let him go; other employers want no part of him unless he can secure an amicable release. He can quit, of course, but probably "with prejudice" — which means the government will make snoots and think mean thoughts about him forever and ever. A fate worse than death, boys and girls, so if you're coming in better be prepared to stay awhile.

As to living conditions, they range — depending on the location — all the way from pretty good to pretty doggone terrible; from farm boarding houses with leaky roofs, no heat and no plumbing, to dank and drafty mausoleums where the hot water and cold differ merely in degree of tepidity. The married guy will do better — I hope. He ought to. (Doesn't he deserve some recompense for voluntarily taking on the job of supporting an able-bodied woman?)

Your inexperienced operator will not rate a big-town station; he will have to get his seasoning in the Three-Eye League. And if he can't do without Broadway, or vice versa, he'd better stick to the subway circuit. Since these stations invariably are located several miles out of town, a car is necessary. With one you can get around a bit and pick your spots in the matter of board.

Board? Well, as the proprietor of the country hotel observed, "This ain't the Waldorf." How right he was! Sow-belly and beans up north, chitlins and hominy grits down south and baloney — ham boloney everywhere!

Well, maybe my experience *has* been unusual. Perhaps I *do* exaggerate a little. After all, what if the food is fierce — the cooking lethal? Have you no soul for the finer things of life? Take it from this IV-F Charley, those bucolic babes can be awful cute sometimes!

And anyhow — *c'est la guerre*, keed! Do you want to live forever? Can't you take it? Don't say nay to the CAA!

Let's go!

But keep your bicarb dry.

Splatter

(*Continued from page 8*)

zoning system is to go into effect in your city. As soon as you know your zone number, advise us (giving your complete name and address to avoid possibility of error), so that we can add it to your membership stencil. So doing will expedite delivery of your copy of *QST* and help the P.O. as well.

...—

FOOTNOTES

EVERY time we start this report on the *QST* contributors of the month we feel a surge of gratitude for those good hams who have given so liberally of their time and energy to keep high the level of interest and information in our mutual magazine.

This month three new names are added to the roster and one former contributor returns. The latter is **B. C. Barbee, W2MWX** (p. 30), about whom we reported sketchily in the May, 1943, issue. What we did not know then is that W2MWX was born in Lovelady, Tex., in 1918, started tinkering with radio in 1931, and was first licensed (W5FPJ) in 1936. He tells us that he majored in math at Austin College, adding, "But until I graduated, the English department thought I was making freshman English my major subject!"

Among the new contributors, **William Davidon, W2OKY,** confesses that he always was, and still is, more interested in designing and trying out new circuits than in building "from the book." Reversing the usual procedure, he learned differential and integral calculus as well as fundamental electrical and radio engineering from a graduate engineer before getting his ham ticket. For results, see p. 25. About now he's graduating from Southwest High in St. Louis, with a Purdue scholarship already in hand for fall. . . . It's been some time since **I. Vee Iverson, W7AW** (p. 35), has appeared in *QST*, but he's no stranger to its pages — nor to ham radio. Active on the air as well as at the shop bench since World War I days, he has always been an indefatigable experimenter. Old-timers will recall that it was W7AW (then 7ADQ) who, as chairman of the technical committee of the Seattle Amateur Radio Club, first tamed and then popularized the old 4-coil Meissner circuit back in 1923–24. He spent some time working with p.a. and theatre sound systems, but having been brought up on a railroad recently returned to r.r. work to stay. Right now he's riding the rails as chief operator of a "rail flaw detector car." . . . **Roger Willco** (p. 40) sounds like a real enough name, but actually it's a pseudonym for a CAA operator who perforce must write anonymously. Its origin should be obvious to anyone who listens on the aeronautical frequencies, for it is heard there a thousand times a day — "Roger" for "R" in the phonetic alphabet, meaning "OK; message received," and "Willco," a telescoping of "will comply."

Elementary A.C. Mathematics

Part VI—Parallel Circuits*

BY GEORGE GRAMMER,** WIDF

PARALLEL circuits, although frequently more difficult to handle than series circuits, yield to the same general method of treatment. As usual, we begin with a simple case. Fig. 35-A shows a resistance and inductive reactance connected in parallel and to a source of voltage, E. Let us assume that the resistance is 100 ohms and the reactance 150 ohms, and that the applied voltage is 300. Then the current through the resistance will be

$$I = \frac{E}{R} = \frac{300}{100} = 3 \text{ amperes}$$

and the current through the inductance will be

$$I = \frac{E}{X_L} = \frac{300}{150} = 2 \text{ amperes}$$

Since the same voltage is applied to both circuit elements the voltage may be used as the reference in constructing the vector diagram. In the resistance the current and voltage are in phase, hence the current vector coincides in direction with the voltage vector; in the inductance the voltage leads the current by 90 degrees and consequently the current vector is drawn downwards as shown in the scale diagram of Fig. 35-B. The total or resultant current, I, is found by completing the parallelogram. Its approximate value, as found by measuring the vector, is 3.6 amp., and the phase angle, θ, is approximately 33.5 degrees, current lagging the voltage.

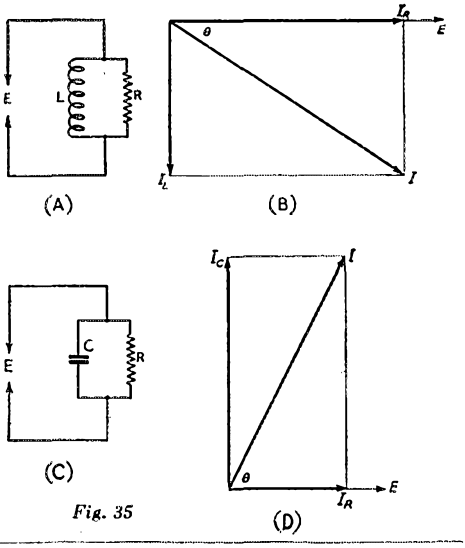


Fig. 35

In a simple parallel circuit of this type the total current may be found from the triangular relationship between I_R, I_L and I, the relationship here being similar to that between reactance voltage, resistance voltage, and total voltage in the series circuit. That is,

$$I = \sqrt{I_L^2 + I_R^2}$$

Substituting the values in the example,

$$I = \sqrt{2^2 + 3^2} = 3.61 \text{ amp.}$$

The phase angle is found from

$$\tan \theta = \frac{I_L}{I_R} = \frac{2}{3} = 0.667$$

and is determined to be 33° 42′ from trigonometric tables.

The general relationship $Z = E/I$ of course holds good for parallel as well as series circuits so we may find the impedance of the circuit simply by dividing the applied voltage by the total current. Thus

$$Z = \frac{E}{I} = \frac{300}{3.61} = 83.1 \text{ ohms}$$

The case of capacity and resistance in parallel is readily solved by the same method. In Fig. 35-C, assume that the capacitive reactance is 250 ohms and that the resistance is 500 ohms. If the applied voltage is 50 volts, the condenser current is

$$I_C = \frac{E}{X_C} = \frac{50}{250} = 0.2 \text{ amp.}$$

and the current through the resistance is

$$I_R = \frac{E}{R} = \frac{50}{500} = 0.1 \text{ amp.}$$

The scale vector diagram is shown in Fig. 35-D; the current and voltage in the resistance are in phase, and the current through the condenser leads the voltage by 90 degrees. The voltage, being common to both elements, is used as the reference.

The triangular relationship between condenser current, resistance current and total current may be used to find the total current. Thus

$$I = \sqrt{I_C^2 + I_R^2} = \sqrt{(0.2)^2 + (0.1)^2} = 0.224 \text{ amp.}$$

The phase angle is found from the usual relationship

$$\tan \theta = \frac{I_C}{I_R} = \frac{0.2}{0.1} = 2$$

to be 63° 26′, with the current leading the voltage. The impedance is

*The series began in QST for February, 1943.
**Technical Editor, *QST*.

$$Z = \frac{E}{I} = \frac{50}{0.224} = 224 \text{ ohms}$$

L, C and R in Parallel

The application of the method to the case where inductance, capacity and resistance are in parallel should be obvious. In the circuit of Fig. 36, assume that the inductive reactance is 40 ohms, the capacitive reactance 65 ohms, and the resistance 75 ohms. Then, if the applied voltage is 10 volts,

$$I_L = \frac{E}{X_L} = \frac{10}{40} = 0.25 \text{ amp.}$$

$$I_C = \frac{E}{X_C} = \frac{10}{65} = 0.154 \text{ amp.}$$

$$I_R = \frac{E}{R} = \frac{10}{75} = 0.133 \text{ amp.}$$

Since the capacitive current leads the voltage by 90 degrees and the inductive current lags by a similar angle, these two currents are flowing in opposite directions at any given instant, hence the resultant of the two is the numerical difference between them. This compares with the resultant of inductive and capacitive *voltages* in the series circuit. If we like, we may make the subtraction directly, obtaining 0.096 amp. as the total current through the inductance and capacity in parallel. Since the current through the inductance is larger, the net reactive current lags behind the applied voltage. However, in the vector diagram of Fig. 36 the step-by-step vector addition is shown; it leads, of course, to the same result as though the two reactive currents had been combined into a single resultant to serve as the basis for the construction of the diagram. By scale measurement the total current, I, is found to be approximately 0.16 amp. and the phase angle, θ, to be approximately 36 degrees, lagging.

The numerical calculation may be performed by the triangular method, in which case it is advantageous to combine the inductive and capacitive currents into a single resultant. This resultant, which we may call I_X, is 0.096 amp. The total current is then

$$I = \sqrt{I_X^2 + I_R^2} = \sqrt{(0.096)^2 + (0.133)^2} = 0.164 \text{ amp.}$$

The phase angle is given by

$$\tan \theta = \frac{I_X}{I_R} = \frac{0.096}{0.133} = 0.722$$

which is the tangent of 35° 48′. The impedance of the complete circuit is

$$Z = \frac{E}{I} = \frac{10}{0.164} = 61.0 \text{ ohms}$$

It is of interest to note here that the total current (frequently called the *line* current, for the reason that it is the actual current flowing in the line connecting to the circuit) may be smaller than the current flowing in one or both of the reactive branches. In our example the line current is smaller than the current in the inductive branch and is only a little larger than the current in the capacitive branch, despite the fact that these currents individually are larger than the current through the resistance. It will be remembered that a comparable situation existed in the series circuit, where the voltages across reactive circuit elements might be larger than the voltage actually applied to the circuit as a whole. In the limiting case, where the inductive and capacitive reactances in parallel are equal, the two currents would be equal and the resultant current would be zero,

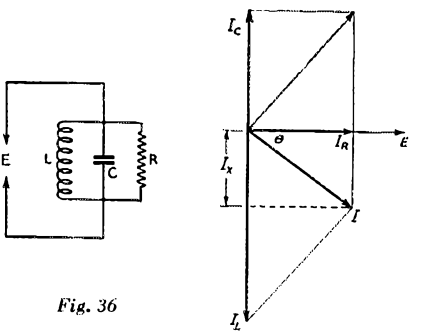


Fig. 36

so that the line current would be numerically equal to the current through the resistance and would be in phase with the applied voltage. So far as the operation of such a circuit (as viewed from its terminals) is concerned, the inductance and capacity could both be removed without causing any change in the amplitude or phase of the line current. We might call such a circuit "resonant," just as a series circuit with equal inductive and capacitive reactances is called resonant. In fact, equal reactances of opposite type frequently constitute the criterion of resonance in a parallel circuit. However, the circuit of Fig. 36 is an idealized one since it assumes that both the inductance and capacity are free from energy losses. Although this assumption is not true, in practice the losses frequently are so small that they may be neglected without introducing intolerable inaccuracy. Nevertheless, their mere presence forces a more careful consideration of what "resonance" means in a parallel circuit. We shall return to this subject later.

Admittance Triangle

In the above examples the impedance and phase angle were determined only after the circuit had been solved for the line current when the applied voltage was known. Given the various reactances and resistances, it is always possible to find the impedance by assuming a voltage and carrying through the solution as above, but a method of determining the impedance without reference to voltage and current would be desirable. In the series case we found the impedance directly by making use of the impedance triangle; this was permissible because the lengths of the voltage vectors entering into the vector diagram were directly proportional to the resistance and reactance, so that simply dividing each voltage by

the current, which was the same in all circuit elements, gave us a triangle of the same shape and having sides equal to the resistance, reactance and impedance, respectively. The impedance triangle does not apply to the parallel circuit, for the reason that the lengths of the current vectors are not directly proportional to the resistance and reactance but are *inversely* proportional to them. However, we can draw an analogy to the impedance triangle.

It will be recalled that the reciprocal of resistance is called conductance and that the reciprocal of reactance is called susceptance, these quantities being designated by the symbols G and B, respectively. That is, $G = 1/R$ and $B = 1/X$. Substituting in Ohm's Law gives

$$I_R = \frac{E}{R} = GE$$

and

$$I_X = \frac{E}{X} = BE$$

If I_R and I_X represent two sides of the vector triangle, the hypothenuse represents the total current, I. Since the amplitude of the total current is proportional to the applied voltage, we may set I equal to YE, where the symbol Y stands for a new quantity called the *admittance* of the circuit. It has previously been determined that $I = E/Z$, therefore $YE = E/Z$, or $Y = 1/Z$. Admittance is consequently the reciprocal of impedance.

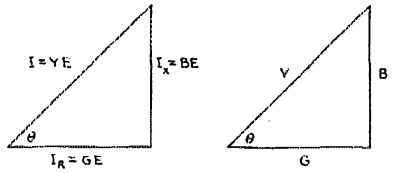


Fig. 37

This leads to the construction of a new triangle called the *admittance triangle*, as shown in Fig. 37, when the common voltage is eliminated to leave B, G and Y alone. By the triangular rule the admittance of a circuit is

$$Y = \sqrt{R^2 + B^2}$$

and the phase angle is given by

$$\theta = \tan^{-1}\frac{B}{G}$$

The side of the triangle representing susceptance is drawn upward for capacitive susceptance and downward for inductive susceptance, since the triangle is based on current vectors and uses the voltage as a reference. In the admittance triangle a positive phase angle therefore represents a leading current and a negative phase angle a lagging current; this is just the opposite of the conditions existing with the impedance triangle. This reversal of signs is simply a mathematical consequence of changing from current to voltage as the reference; in effect, it says that if in a given circuit the current leads the voltage then the voltage in that circuit lags behind the current.

To illustrate the use of the admittance triangle let us apply it to the example of Fig. 36. The conductance is

$$G = \frac{1}{R} = \frac{1}{75} = 0.0133 \text{ mho}$$

(The unit of conductance is the mho, or "reciprocal ohm"; a circuit having a resistance of one ohm also has a conductance of one mho.) The inductive susceptance is

$$B_L = \frac{1}{X_L} = \frac{1}{40} = 0.025 \text{ mho}$$

The capacitive susceptance is

$$B_C = \frac{1}{X_C} = \frac{1}{65} = 0.0154 \text{ mho}$$

The net susceptance is the difference between the inductive and capacitive susceptances, and since the capacitive susceptance vector is drawn upward while that for the inductance is drawn downward, we associate the minus sign with the latter. Hence

$$B = B_C - B_L = 0.0154 - 0.025 = -0.0096 \text{ mho}$$

where the negative sign in the result indicates that the current lags behind the voltage. The admittance of the circuit is consequently

$$Y = \sqrt{B^2 + G^2} = \sqrt{(-0.0096)^2 + (0.0133)^2}$$
$$= \sqrt{0.000269} = 0.0164 \text{ mho}$$

The tangent of the phase angle is

$$\tan\theta = \frac{B}{G} = \frac{-0.0096}{0.0133} = -0.722$$

with the negative sign indicating a lagging current. The impedance of the circuit is

$$Z = \frac{1}{Y} = \frac{1}{0.0164} = 61.0 \text{ ohms}$$

In this case the amount of numerical work required by either method of solution is about the same. The admittance method can be used to advantage in more complicated circuits, and also may be a convenience if the circuit data are not in terms of reactances. For example,

$$B_L = \frac{1}{X_L} = \frac{1}{2\pi fL}$$

and

$$B_C = \frac{1}{X_C} = \frac{1}{\frac{1}{2\pi fL}} = 2\pi fC$$

so that the susceptances can be obtained directly from the inductance and capacity without finding reactance as an intermediate step. Once the susceptance, conductance and admittance are determined, the current at any applied voltage can be found from the Ohm's Law formulas. Thus in the preceding example, with 10 volts applied,

$I_L = B_L E = 0.025 \times 10 = 0.25$ amp.
$I_C = B_C E = 0.0154 \times 10 = 0.154$ amp.
$I_R = GE = 0.0133 \times 10 = 0.133$ amp.
$I = YE = 0.0164 \times 10 = 0.164$ amp.

Parallel Reactances

When a simple parallel circuit has a number of branches, elements of the same kind may be combined into a single equivalent element, just as similar elements may be combined in series circuits. However, it is obvious that two reactances of the same kind in parallel will have less reactance than either one alone, in the same way that the net resistance of two resistances in parallel is less than that of either by itself. If we have, for instance, two inductive reactances, one of 50 ohms and the other of 75 ohms, in parallel and apply 100 volts to them the current through the first will be

$$I_1 = \frac{100}{50} = 2 \text{ amperes}$$

and the current through the second will be

$$I_2 = \frac{100}{75} = 1.33 \text{ amp.}$$

Since both currents lag the applied voltage by 90 degrees they may be added directly, so that the total current is

$$I = I_1 + I_2 = 2 + 1.33 = 3.33 \text{ amp.}$$

The total reactance of the two inductances in parallel is therefore

$$X = \frac{E}{I} = \frac{100}{3.33} = 30 \text{ ohms}$$

While this method of finding net reactance could be extended to any number of similar reactances in parallel, it is evident that the net reactance is inversely proportional to the total current, and since susceptance is inversely proportional to reactance, the total susceptance is therefore *directly* proportional to the total current. Or, simply, the total susceptance is the sum of the individual susceptances in parallel. In the above example the susceptance of the first inductance is

$$B_1 = \frac{1}{50} = 0.02 \text{ mho}$$

and that of the second is

$$B_2 = \frac{1}{75} = 0.0133 \text{ mho}$$

so that the total susceptance is

$$B = B_1 + B_2 = 0.02 + 0.0133 = 0.0333 \text{ mho}$$

Hence the reactance is

$$X = \frac{1}{B} = \frac{1}{0.0333} = 30 \text{ ohms}$$

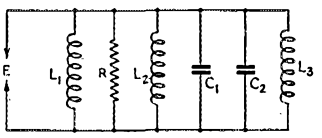


Fig. 38

A circuit such as that in Fig. 38, for example, can easily be reduced to a single equivalent susceptance and a conductance. Using the convention described above with respect to signs associated with inductance and capacity, the total susceptance is

$$B = -B_{L1} - B_{L2} + B_{C1} + B_{C2} - B_{L3}$$

If we wish to know the total susceptance of one kind — the total capacitive susceptance, for instance — we simply add all the susceptances of that kind together. The total conductance of any number of resistances in parallel similarly can be found by adding their individual conductances.

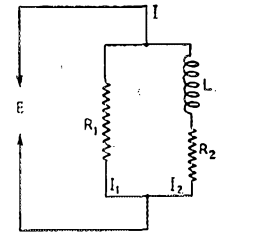


Fig. 39

Series-Parallel Circuits

We come now to the case where a branch of a parallel circuit may contain more than one kind of circuit element. In Fig. 39, for example, one leg of the circuit contains resistance and the other leg has resistance and inductance in series. Since the second branch contains resistance and inductance in series, the phase angle between the current through that branch and the voltage E applied to it will not be either zero or 90 degrees, consequently the method of solution previously used cannot apply. We must first find the amplitude and phase angle of the current in this branch alone before we can combine this branch current with the current flowing through R_1. To do this we first confine our attention to the series circuit formed by L and R_2.

Let us again assume some values for the sake of illustration, making $E = 80$ volts, the reactance of $L = 50$ ohms, $R_2 = 20$ ohms, and $R_1 = 60$ ohms. The impedance of the series circuit formed by L and R_2 will be

$$Z = \sqrt{X_L^2 + R_2^2} = \sqrt{(50)^2 + (20)^2} = 53.9 \text{ ohms}$$

The current in this branch therefore will be

$$I_2 = \frac{E}{Z} = \frac{80}{53.9} = 1.48 \text{ amp.}$$

and the phase angle is found from

$$\tan \theta_2 = \frac{X}{R} = \frac{50}{20} = 2.5$$

This is the tangent of 68° 12′. The vector diagram for this portion of the circuit, using the current as a reference since it is a series circuit, is shown in Fig. 40-A. The resultant voltage, E, is the voltage applied to the parallel circuit and is therefore the voltage applied to R_1. Consequently this vector becomes the reference for the parallel circuit. To simplify matters we can put E in the horizontal position, where we usually have our reference, and draw I_2 to a suitable scale so that

we have the arrangement shown in B. We then lay off I_1 to scale along E, since I_1 is in phase with E, its amplitude being

$$I_1 = \frac{E}{R_1} = \frac{80}{60} = 1.33 \text{ amp.}$$

The vector diagram of the parallel circuit is completed as in Fig. 40-C, where the current is found to be approximately 2.3 amp. and the phase angle approximately 36 degrees, lagging. It would have been possible, although perhaps a little more confusing, to complete the original vector diagram without shifting E to the reference position; the complete diagram is shown in Fig. 40-D for comparison. In such a case both voltages and currents must be drawn to suitable scales; by breaking the diagram into parts it is only necessary to scale the values to be found at the moment. Thus, in Fig. 40-A, I_2 need not be scaled, nor does E need to be in Figs. 40-B and 40-C.

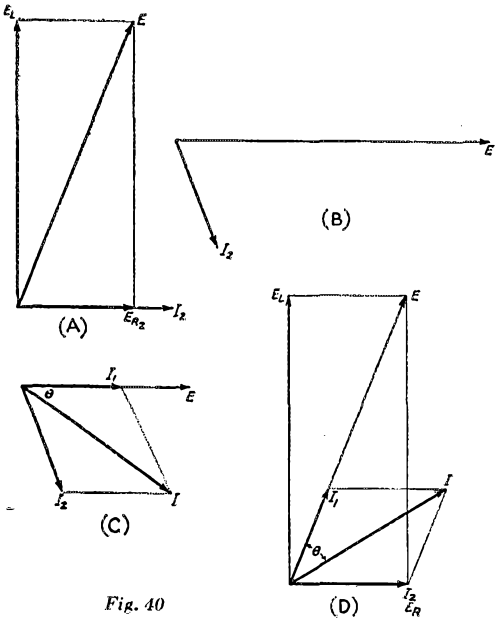


Fig. 40

To obtain the solution by calculation we return to the method described in the section on vectors. Having found the current and phase angle in the second branch, and using E as a reference,

$$I \cos \theta = I_1 \cos 0° + I_2 \cos 68° 12'$$
$$I \sin \theta = I_1 \sin 0° - I_2 \sin 68° 12'$$

Substituting the values, those for the angular functions being obtained from trigonometric tables, we have

$$I \cos \theta = (1.33 \times 1) + (1.48 \times 0.371) = 1.33 + 0.55 = 1.88$$
$$I \sin \theta = (1.33 \times 0) - (1.48 \times 0.928) = 0 - 1.37 = -1.37$$

The resultant current is

$$I = \sqrt{(I \cos \theta)^2 + (I \sin \theta)^2}$$
$$= \sqrt{(1.88)^2 + (-1.37)^2} = 2.33$$

The phase angle between the applied voltage and the line current is found from

$$\tan \theta = \frac{I \sin \theta}{I \cos \theta} = \frac{-1.37}{1.88} = -0.729$$

which is the tangent of 36° 6′. The tangent is negative so the phase angle is negative; that is, the current is lagging behind the voltage, since the voltage is used as the reference.

Conductance and Susceptance

It will be worth our while to investigate the second branch of the circuit a little further. If the vector diagram of this branch, shown at A in Fig. 40, is rotated so that the vector for the resultant voltage is horizontal, we can use this vector as the reference as shown in Fig. 41, where θ_2 is the angle between voltage and current in the branch containing L and R_2. Then the sine and cosine components of I_2 may be laid off on the proper axes as shown, *as though* I_2 could be divided into two components of current — although it is actually a single current since the circuit elements are in series. But if we pretend that these components have existence, it becomes evident that by ignoring E_{R_2} and E_L the diagram of Fig. 41 is similar to that of Fig. 35-B, which is the vector diagram of a resistance and inductance in *parallel*. That is, the series circuit may be transformed into an *equivalent* parallel circuit, equivalence being determined by the fact that if a given voltage is applied to either circuit, the amplitude of the current will be the same in both cases and the phase angle between current and voltage will likewise be the same. "Looking into" the two circuits the source of voltage could not tell which actually was connected. Obviously the transformation can be carried out both ways — for every series circuit there is an equivalent parallel circuit, and for every parallel circuit an equivalent series circuit. If the second branch of the circuit of Fig. 39 is transformed into an equivalent parallel circuit, the circuit as a whole may be redrawn as in Fig. 42, where R_{2E} and L_E are the parallel inductance and resistance equivalent to the actual series-connected elements R_2 and L. This is a simple parallel circuit and can be handled by the elementary methods first described, provided we know the values of R_{2E} and L_E; or rather, provided we know the conductance of R_{2E} and the susceptance of L_E.

In the second branch of the circuit of Fig. 42, that consisting of R_{2E}, the current is $I_2 \cos \theta_2$, from the diagram of Fig. 41, while the current in the third branch, L_E, is $I_2 \sin \theta_2$. $I_2 \cos \theta_2 = GE$, where G is the conductance of R_{2E}, and $I_2 \sin \theta_2 = BE$, where B is the susceptance of L_E, and $I_2 = YE$, where Y is the admittance of R_{2E} and L_E in parallel. Hence,

$$G = \frac{I_2}{E} \cos \theta_2 = Y \cos \theta_2$$

and

$$B = \frac{I_2}{E} \sin \theta_2 = Y \sin \theta_2$$

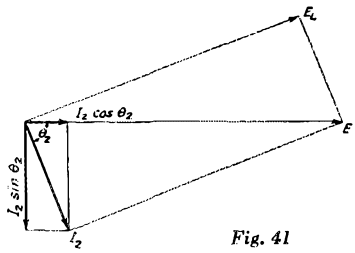


Fig. 41

Now θ_2 is the same both in the actual series circuit and in the equivalent parallel circuit, so we may use the known values of resistance and reactance to determine its sine and cosine functions. From the impedance triangle,

$$\cos \theta_2 = \frac{R_2}{Z} = \frac{R_2}{\sqrt{R_2^2 + X_{L2}}}$$

and

$$\sin \theta_2 = \frac{X_L}{Z} = \frac{X_L}{\sqrt{R_2^2 + X_L^2}}.$$

Substituting the cosine value,

$$G = Y\frac{R_2}{Z} = \frac{1}{Z} \cdot \frac{R_2}{Z} = \frac{R_2}{Z^2} = \frac{R_2}{R_2^2 + X_L^2}$$

Similarly,

$$B = \frac{X_L}{Z^2} = \frac{X_L}{R_2^2 + X_L^2}$$

Substituting the given values in the example, we have

$$G = \frac{20}{(20)^2 + (50)^2} = 0.0069 \text{ mho}$$

and

$$B = \frac{50}{(20)^2 + (50)^2} = 0.0172 \text{ mho}$$

The first branch of the circuit of Fig. 42 contains only the resistance R_1, consequently its conductance is equal to $1/R_1$. Since R_1 is 60 ohms, the conductance is 1/60, or 0.0167 mho. The total conductance of the equivalent circuit is then the sum of the two conductances, which is equal to 0.0236 mho. The only susceptance is that of L_E, so that for the circuit as a whole,

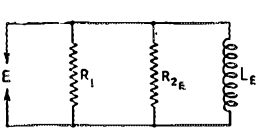


Fig. 42

$$Y = \sqrt{B^2 + G^2} = \sqrt{(0.0172)^2 + (0.0236)^2}$$
$$= 0.0292 \text{ mho.}$$

The total current is therefore

$$I = YE = 0.0292 \times 80 = 2.33 \text{ amp.}$$

The tangent of the phase angle is

$$\tan \theta = \frac{B}{G} = \frac{0.0172}{0.0236} = 0.729$$

By either method the impedance of the circuit is given by

$$Z = \frac{E}{I} = \frac{80}{2.33} = \frac{1}{Y} = \frac{1}{0.0292} = 34.3 \text{ ohms}$$

In general, the conductance of any circuit containing resistance and reactance in *series* is

$$G = \frac{R}{R^2 + X^2}$$

where R is the total resistance and X the total reactance, capacitive and/or inductive, in the series circuit. The susceptance is

$$B = \frac{X}{R^2 + X^2}$$

It does not matter how many separate resistance and reactance elements there are, so long as they are all in series and the resistances are grouped into one total resistance and the reactances are combined into one net reactance. These formulas are more general than the simple ones previously used in the case where only resistance or reactance was present, but they can readily be reduced to the same ones. If the branch contains only resistance then X is zero in the formula for G, leaving $G = R/R^2 = 1/R$, while if the branch contains only reactance R becomes zero in the formula for B, reducing the expression to $B = 1/X$. It is necessary to remember that B is negative if the reactance is inductive, and positive if the reactance is capacitive.

More Complex Circuits

To illustrate the application to a more complex circuit let us assign the following values to the circuit elements in Fig. 43:

$R_1 = 200$ ohms
$R_2 = 300$ ohms
$R_3 = 50$ ohms
$R_4 = 100$ ohms
$X_{C1} = 400$ ohms
$X_{C2} = 600$ ohms
$X_{L1} = 450$ ohms
$X_{L2} = 250$ ohms

The conductance of the first branch is

$$G_1 = \frac{R_1}{R_1^2 + X_{C1}^2} = \frac{200}{(200)^2 + (400)^2}$$
$$= 0.001 \text{ mho}$$

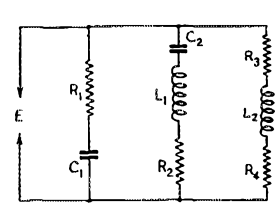


Fig. 43

The susceptance of this branch is

$$B_1 = \frac{X_{C1}}{R_1^2 + X_{C1}^2} = \frac{400}{(200)^2 + (400)^2}$$
$$= 0.002 \text{ mho}$$

In the second branch we can immediately combine X_{C2} and X_{L1}, the net reactance, X_2, being 450 — 600 ohms, or −150 ohms. Since the reactance is negative the susceptance will be positive, so

$$B_2 = \frac{X_2}{R_2^2 + X_2^2} = \frac{150}{(300)^2 + (150)^2} = 0.00133 \text{ mho}$$

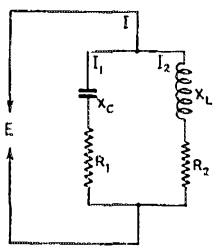


Fig. 44

The conductance of this branch is

$$G_2 = \frac{R_2}{R_2^2 + X_2^2} = \frac{300}{(300)^2 + (150)^2} = 0.00267 \text{ mho}$$

In the third branch, we can combine R_3 and R_4 into a single resistance, R, equal to their sum, so that $R = 150$ ohms. Then the conductance of this branch is

$$G_3 = \frac{R}{R^2 + X_{L2}^2} = \frac{150}{(150)^2 + (250)^2} = 0.00176 \text{ mho}$$

while the susceptance is

$$B_3 = -\frac{X_{L2}^2}{R^2 + X_{L2}^2} = -\frac{250}{(150)^2 + (250)^2} = 0.00294 \text{ mho}$$

Combining the conductances and susceptances gives

$$G = G_1 + G_2 + G_3 = 0.001 + 0.00267 + 0.00176 = 0.00543 \text{ mho}$$

$$B = B_1 + B_2 + B_3 = 0.002 + 0.00133 - 0.00294 = 0.00039 \text{ mho}$$

The admittance is

$$Y = \sqrt{G^2 + B^2} = \sqrt{(0.00543)^2 + (0.00039)^2} = 0.00554$$

and the impedance is

$$Z = \frac{1}{Y} = \frac{1}{0.00554} = 181 \text{ ohms}$$

The phase angle is found from

$$\tan \theta = \frac{B}{G} = \frac{0.00039}{0.00543} = 0.0718$$

which is the tangent of 4° 6′. Since the total susceptance is positive the current leads the voltage, so that the net reactance of the complete circuit is capacitive. The circuit thus acts like a condenser in parallel with a resistance, the capacitive reactance being high compared to the resistance as indicated by the low value of susceptance compared to conductance. The equivalent values may be found from the conductance and susceptance. Thus the equivalent resistance is

$$R = \frac{1}{G} = \frac{1}{0.00543} = 184 \text{ ohms}$$

and the equivalent reactance is

$$X = \frac{1}{B} = \frac{1}{0.00039} = 2560 \text{ ohms}$$

Resonance

We return now to the question of resonance in a parallel circuit. In Fig. 44 let us assume that the capacitive reactance is 200 ohms, R_1 is 40 ohms, R_2 is 75 ohms, and that the inductive reactance can be varied over a range of values above and below 200 ohms. If we select a series of values for X_L and solve for the current I_2 through the inductive branch at some convenient value of applied voltage such as 100 volts, we find that the end point of the vector I_2 describes the curve PR in Fig. 45 as X_L is varied. PR is said to be the *locus* of the end point of the vector. I_1, the current through the capacitive branch, may also be plotted on the diagram to the same scale, so that if various values of I_2 are selected a similar locus may be found (by completing the parallelograms) for the line current, I. In Fig. 45 the locus of I is the curve ST.

If we make $X_L = 200$ ohms so that it is the same as the capacitive reactance in the circuit, the current in the inductive branch is represented by the vector I_{2B} in Fig. 45. The line current in this case is I_B. By calculation, the line current is 0.263 amp. and the phase angle of the complete circuit is 9° 23′, current leading the voltage. The impedance of the circuit is 380 ohms. Obviously, since there is no deep significance to a phase angle of slightly more than 9 degrees, there is likewise no particular significance to be attached to the fact that the two reactances are equal.

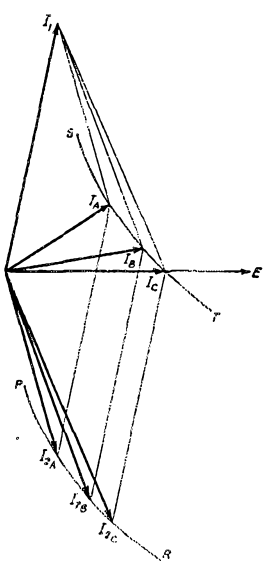


Fig. 45

However, from consideration of the line-current locus, it becomes clear that two points of some significance do exist. One of these is the point which makes the line-current vector coincide with the vector of the applied voltage; that is, the set of conditions which makes the phase angle between line voltage and current equal to zero. In such a case the par-

(Continued on page 68)

China Celebrates Amateur Radio Day

ARRL Officials Participate in Special OWI Broadcast to China Amateur Radio League Conventions, May 5th

A LETTER from Dr. U. T. Hsu, president of the China Amateur Radio League, published on page 47 of our April issue, told us all that the CARL was going to hold its fifth convention on May 5th in Chungking, with every section of that league participating through its radio network. What the good doctor did not make entirely clear is that May 5th is now officially recognized by the Chinese government as China Amateur Radio Day, and that the convention took the form of assemblies of amateurs in all the major cities of Free China, linked by an amateur network under government blessing.

This, of course, is a monumental accomplishment, especially in time of war, and it deserves special recognition. The Radio Society of Great Britain and other amateur associations of the United Nations were quick to send messages of congratulation and good wishes. For our own part, we sent the following radiogram to Dr. Hsu, through the kind courtesy and facilities of our Department of State and Office of War Information:

THE PRESIDENT AND HEADQUARTERS STAFF OF THE AMERICAN RADIO RELAY LEAGUE ARE HONORED BY THIS OPPORTUNITY TO SEND GREETINGS TO THE CHINA AMATEUR RADIO LEAGUE CONVENTION AND OFFICERS. THE AMATEUR RADIO NETWORK WHICH TODAY LINKS THE CITIES OF FREE CHINA EXTENDS IN SPIRIT TO THE AMATEURS OF ALL ALLIED NATIONS. THE STUDY OF RADIO SCIENCE IS IMPORTANT IN OUR MUTUAL DETERMINATION FOR VICTORY. THE WORK OF RADIO AMATEURS IS RICHLY CONTRIBUTING TO THAT END. YOUR SPLENDID COURAGE AND DETERMINATION DESPITE DIFFICULTIES TYPIFY THE BEST SPIRIT OF THE RADIO AMATEUR AND ARE AN INSPIRING EXAMPLE TO US ALL. MAY EVERY SUCCESS ATTEND YOUR EFFORTS!

As the date approached, Chungking asked the OWI Overseas Division to promote a special shortwave broadcast commemorating the occasion, and ARRL's President G. W. Bailey, W1KH, and Secretary K. B. Warner, W1EH, were asked to participate. The half-hour program, incorporating talks by both of them, with translations into Chinese, went out from KWID on 7230 kc. (familiar frequency!) and some frequency in the 8-Mc. band at 4:30 A.M. PWT, May 5th, which was 8:30 P.M. in Chungking that day. W3ART, who is communications engineer for OWI at Chungking, reports that the program was well received and was successfully rebroadcast over Free China via the amateur network.

We believe that the remarks of Messrs. Bailey and Warner hold general interest for amateurs everywhere, so we are reproducing them. First, Mr. Bailey's greetings:

This is W1KH calling all our Chinese brothers on China Amateur Day. On behalf of the American Radio Relay League, I greet you. I send the affectionate regards of our 30,000 members to you, the members of the China Amateur Radio League. Although our transmitters are silent, we want you to know that we are carrying on the spirit of amateur radio. More than 20,000 of us are serving right now in the Armed Forces of the United States. In addition, many of us who are staying home are enrolled in the War Emergency Radio Service. We know a good deal about your work. We are proud of what you are doing for our country as well as your own. Although we are no longer linked together by the medium of our amateur bands, we are thrilled by the thought that the continuous shortwave transmissions between your nation and ours are largely the result of the work which you in China and we in the United States have done over the years in amateur radio. When the lights go on again all over the world, they will include the lights in the filaments of our transmitter tubes, and we can then exchange reminiscences of these days of war, and we can thank you properly and personally for the part you are playing in achieving victory.

Secretary Warner was asked to talk on the war rôle of radio amateurs in the United Nations. His remarks:

It is a great privilege to have this opportunity of addressing you on China Amateur Radio Day — an occasion which is being celebrated throughout Free China by the Fifth Annual Conventions of the China Amateur Radio League.

In many nations of the world the voice of amateur radio is momentarily stilled by the clamor of war. Yet, even though the fundamental purposes and functions of amateur radio are temporarily suspended, the value of amateur radio to our nations is now magnified many times.

In the international treaties a radio amateur is defined as a person interested in the technique of radio communication from a purely personal standpoint, without pecuniary interest. The practice of amateur radio, in times of peace, has always resulted in great benefits to the nations whose governments have encouraged it. By his pursuit of a technical avocation, the radio amateur trains himself to a high state of proficiency in a difficult art, and at his own expense. And because he is impelled by a great love for what he is doing, rather than by the hope of monetary gain, he often acquires knowledge and skill superior to the professional. Thus there has come into existence, in the democratic countries of the world, a large body of trained radio experimenters and technicians. Through their experimental work and the constant endeavor to improve their apparatus, the amateurs make many notable contributions to man's knowledge of the radio art. Their skill in communicating, often with humble equipment, has not only linked the far corners of the earth in friendly correspondence but is often put to practical use in emergencies which interrupt the public communications system.

Today the rôle of the amateur has changed. Your country and my country are allies in a great war. All of our peoples desire, beyond everything else in life, to make the most effective contribution they can to the winning of the victory which is necessary to permit us to walk as free men. In all the United Nations the radio amateurs have a peculiarly important participation in that great effort. This is a war of communications. Skilled and experienced radio technicians and operators are needed in great number. The complexities of this science cannot be taught new people overnight. The United Nations are fortunate in that they have long pursued the wise policy of fostering and encouraging the pursuit of amateur radio. Now their radio amateurs are bringing to their assistance all the skill and experience they accumulated

during their years of experimentation. There is no substitute for this rich experience. It has given the radio amateur a fuller knowledge of how radio performs and it has developed in him an ingenuity and a versatility that can never be taught in classrooms. It is his privilege to give his country a more important help than the untrained man can give — a special ability which is badly needed.

Throughout the allied nations the radio amateur is performing a function of special value. As an operator, he needs but little instruction. Show him the station and he will operate it. As an instructor, he is ready to step into the classroom and teach others. As a technician, he has a feel and understanding for circuits and a love of radio that leave but little more to teach him. Show him the apparatus and he will maintain it.

Radio amateurs serve in every branch of the war. On the civilian front they perform research and development work, and in the military forces they provide the nucleus of trained operators and maintenance men that vitalizes the network of communications so utterly indispensable to the successful prosecution of modern warfare.

On both fronts amateurs bring to their work a unique devotion and ability which, coupled with their early self-training which so greatly expedited the development of our military machine, makes their contribution of the greatest importance. In the development of new scientific devices the freshness and originality of viewpoint of those engaged in research, unhampered by rulebook fetishes, is the perfect opposite of the regimented thinking of our foes. In the construction and maintenance of these new devices their instinctive understanding of principles and their inborn adaptability make them especially effective: they understand quicker, learn faster.

On the fighting fronts their operating skill is equally valuable. Sharpened to the highest degree by years of communicating experience under the severest conditions of congestion, and with low-powered equipment, the amateur has the ability to hear signals so faint that they are inaudible to the average ear; and to read those signals when they are so confused with interference that for ordinary operators they are completely garbled. These capabilities make him a key figure in military communications. Any experienced communications officer prays for radio amateurs to be assigned to his command.

All over the freedom-loving world the radio amateurs have turned their hearts and hands to the cause of liberty. Particularly in Great Britain, the British dominions, the Soviet Union and the United States we see them — as we do in China — forming the first backbone of the communications systems as the United Nations girded themselves for the tremendous struggle that lay ahead. Nor have they been idle in the occupied countries. There is little that we can now say about those activities but some day there will be an epic story to be told, and we have no doubt that Chinese amateurs have a chapter of their own to be written into that story.

Now more specifically, what is the amateur doing in this war and why is he valuable in it? First, amateurs are serving by the tens of thousands in the communications organizations of the armed forces, both as enlisted operators and technicians and as commissioned officers. Many of them are in high places. And this is true of every branch of the fighting forces. Wars rarely progress according to perfect plans. Almost always it is necessary to do the unexpected, the impossible, and to do it without the equipment and the system that were planned. Here is where the amateur is invaluable, for that is precisely what he has been accustomed to as a private experimenter. He has the ability to improvise, and he can do so with understanding because he has had to do it throughout his career as an amateur. In other words, whatever the circumstances, he knows how to get results. Moreover, military radio is more than mere communications. Radio has many ingenious new adaptations to the problems of war, and in these new fields the amateur is a particularly valuable worker because he is by nature an unconventional thinker with a roving interest in new circuits and a quick appreciation of their possibilities.

Of course there are many amateurs who, for one reason or another, are not able to be members of the military services; but they too are bringing their skills into our common war effort. Many of them serve as instructors in the large schools which have everywhere been established to give radio knowledge to more and more people. Many more are to be found in civilian capacities in the many agencies of our governments where a knowledge of radio is a priceless thing. Indeed, in the agency of my own country's government which is bringing this message to you to-day you will find many an experienced amateur in a position of high responsibility, doing work which, except for him, could never be accomplished at all. Many hundreds of highly advanced amateurs are working in the laboratories where improved apparatus and new devices are being developed. They are important there because in their natures is a restless curiosity for new ideas, which often leads them to accomplish the impossible because they did not know that it could not be done! They hit upon new and better ways of doing things because, in their amateur work, they generally have not had the facilities for doing things in the conventional and approved way and have had to learn to improvise. And still other amateurs, literally to be counted in the tens of thousands, are working in the radio factories of the United Nations, using their manual skill and their testing knowledge for the production of the equipment which is so vital to our victory.

It is easy to see that our war task would have been a great deal more difficult were it not for the existence of these radio amateurs. They stepped in at once, in these many places where their aid was desperately needed, and they formed the nucleus around which the vast wartime radio structures of our countries have grown. These are days when we all search our souls to be sure that we are doing all we can for the causes we love. I feel that it can be said beyond doubt that the amateur is richly justifying his existence.

Thus it is of great value to the cause of freedom that the China Amateur Radio League should be engaged in a nationwide program to encourage and assist the study of radio science. It is a vital field in which much more help is needed. It will unquestionably assist the winning of the war. And in the days of peace to come, it will mean that an increased number of the world's people will enjoy the ability to communicate with one another, an activity which will greatly assist in perpetuating the understanding and good will that exist between our two countries. You radio amateurs of China have a transcendent opportunity for service at this time. Yours is the obligation to match the heroic rôle of the Chinese people as a whole — standing resolutely athwart the pathway of the invader. Knowing your past record of performance, I know you will not fail that trust.

The amateurs of the United States send warm greetings to their fellow amateurs in China. They look forward to that day when our united efforts shall bring victory, and, with it, the resumption of our friendly contacts by direct communication through our own amateur stations. Until then, very seventy-three.

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1MQT, Joseph E. Cabral, jr., New Bedford, Mass.

W3GVC, Charles F. Helmuth, Absecon, N. J.

W3IRI, Ensign Bernard F. J. Nolan, USN, Trenton, N. J.

ex-W4ENS, Forress E. Towns, McRae, Ga.

W4EVT, Aviation Cadet Luther A. Harrell, jr., Valdosta, Ga.

W5KJM, Iva Cleo Clark, Drumwright, Okla.

W9LKJ, ex-W6JQW, Lt. Carl J. Schneider, USMCR, Peoria, Ill.

GW8HI, Percival Bevan, Gower, Glamorganshire

ZL1BO, Capt. Thomas Paterson, Ngaruawahai, N. Z.

STRAYS

By means of Signal Corps radiotelephoto stations, pictures of a recent early-morning air raid on Italian bases on Sardinia were published in evening editions of American newspapers of the same date.

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One of the newest developments in use by the Signal Corps in field communications is a four-wire cable the size of a lead pencil. By means of carrier-current technique, three telephone and four telegraph circuits may be handled simultaneously over a single cable. The cable does not require the use of poles, which are almost non-existent in many battle areas; instead, it may be laid along the surface of the ground for distances up to 150 miles, operating with the aid of amplifiers spaced along the way.

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Reminding us of W6FKL's *Stray* in the February, 1941, issue, a number of relays, counters, solenoids and similar electrical devices taken from confiscated pin-ball machines are being used by the Signal Corps at Ft. Monmouth in the extensive air-raid warning system developed there.

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At least one ham is still able to make contacts and get QSLs. W8OQI, who is a brakeman in Cleveland, gets good results by occasionally writing his call, accompanied by "Pse QSL," on the side of box cars. When we wrote him, we found that we were his first Illinois contact, giving him his sixteenth state!— *W9MXD.*

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Amateur Radio, the official organ of the Wireless Institute of Australia, quotes portions of an interesting letter from "Snowy" Campbell, VK3MR, who is being held as a prisoner of war in Italy:

"I have had some great times since leaving home. Whew and whato! I also have done a spot of touring at the expense of both governments, seeing Sicily and this country. Italy is a beautiful place. Here we are in the mountains near the northern part. When we came in February, all was hushed and quiet with beautiful snow. Now it is Spring, everything at its best. Hills are a vivid green with grass feet high and a countless number of wild flowers. We are taken for walks occasionally, therefore we see quite a lot of the country and its people who are usually very friendly and very fed up with things generally. I am keeping mentally fit by running a radio class for 625 pupils. I worked for 'Jerry' for 8 months in Tripoli before coming here. Have met many hams, including a D."

In April Arthur Erickson, W1NF, celebrated his 40th (!) anniversary as a ham. He was 9 years old when he put his first rig on the air at Manchester, Mass., in 1903, signing the call ZZ.

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Slipping of dial cable around a control-knob shaft can be prevented by rubbing the shaft with beeswax. — *W9QYL.*

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A scale has been designed to enable a blind person to enter the field of precision weighing. The operator wears headphones which give the audible signal A in Morse code when the scale shows underweight and the signal N if overweight is registered. The correct weight is signaled by an unbroken tone. — *Ohmite News.*

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Featuring a radically new method of assembling radio communication receivers from three basic cells and using only one type of tube in the entire circuit regardless of its complexity, the Electronics Division of the Harvey Machine Co., Los Angeles, announce the introduction of their unitized-construction radio receivers. Differing from conventional aircraft and highly portable military types, these receivers are an assembly of four or more "cells," each cell being a complete element of a radio circuit. Three types of cells are produced in quantities: r.f. units, i.f. units and audio-amplification units. It is said that the new design eliminates approximately 95 per cent of the hook-up wire usually required in a receiver, and permits the use of one type of tube in place of six or more different types usually required.

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After a recent test blackout in Washington, the OCD office was mildly criticized for having a light showing on a 15-foot mast on the roof of the building. Upon investigation, the "light" turned out to be the filament of a tube in the WERS transmitter mounted on the pole!

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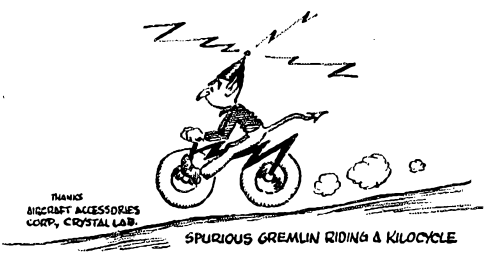


Who Killed the Signal?

A Radio Mystery Serial

BY CLINTON B. DESOTO,* WICBD

Conclusion—"This Is Murder"

SHADOWS lengthened in strange angular lines along the dusky interior of the chassis. Dial Light's feeble rays could scarcely dispell the gathering gloom. The day was drawing to a close.

But the gloom over the chassis did not extend to the Sleuth and his satellites. Gathered in the little clear space behind the chassis apron, a spirit of confidence enlivened them as they planned their next move. Oscillator Tube's parting words still rang in their ears. "Remember," he had said, "logical deduction and the process of elimination — these are what you need."

"This time we'll make sure," the Sleuth declared quietly, tapping the tightly-rolled circuit diagram against the side of his leg. "We've already gone through all the stages in this part of the set — R.F., Mixer, Oscillator," he continued, unrolling the diagram. "Now, according to this the next party we should interview is I.F. Tube."

"How come you spend so much time talking to these Tubes?" Ohm demanded. "Those other Parts beneath your notice?"

"The Tubes seem to be the most articulate," the Sleuth explained. "What's more, they're right in the center of things and pick up everything that goes on in their own little circle."

"That's right," Signal Generator agreed sagely. "Always check the Tubes first when you're investigating a case like this."

The Sleuth nodded. "Now," he asked, "how do you propose we go about checking on this I.F. stage? Do you want to test it out or shall I talk with I.F. Tube first?"

"You go ahead and see what he has to say," Signal Generator replied. "Then if he gets his wires crossed I'll tackle him."

Returning to the chassis, the Sleuth had little difficulty identifying I.F. Tube, a bluff, blunt fellow closely resembling R.F. Tube.

"You don't need to tell me who you are," I.F. Tube greeted him. "I know all about you. You're trying to find out who killed the Signal. You've been all around the set and now you've come to question me."

The Sleuth nodded. I.F. Tube continued: "I suppose you want my IQ, police record, blood test, social security number and everything else. Well, my type number happens to be 6K7 — which is the same as R.F. Tube's, and anything you learned about him goes for me, too."

"That can't be entirely true," the Sleuth observed mildly. "For one thing, I happen to know you two work at different frequencies."

"If all your observations are that superficial you won't get very far with this case," I.F. Tube retorted acidly. "Just because one man shovels coal and another shovels iron ore doesn't make them different kinds of men. The frequency applies only to the current we handle — not to our own personal characteristics. Change R.F. Tube and myself around and we could each handle the other's job just as well."

"And of course that isn't true of Mixer Tube or Oscillator Tube — they're different types."

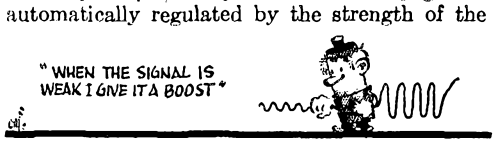
"Of course."

"But isn't there some other difference, too?" the Sleuth persisted. "According to this diagram your various connections don't look quite the same as R.F. Tube's. There's this a.v.c. line —"

"Oh, that. That's purely a business connection, too — not a family one at all. Remember what R.F. Tube told you about his variable-amplification characteristic? How the wires of his grid are spaced with progressively-increasing pitch so the grid bias 'closes' one end faster than the other?"

"Yes. He called it a remote cut-off grid — said it kept the signal from overloading him."

"That's right. He told you, too, that because of it he could amplify weak signals more than strong ones. Well, that's how this a.v.c. — 'automatic volume control' is the full name — works. It's very simple, really. The bias on my grid is automatically regulated by the strength of the



incoming signal. When the signal is strong I amplify it very little and when it's weak I give it a big boost. That keeps the output constant."

"Where does this automatic bias come from?"

"It comes direct from the signal itself, through Detector Tube. He rectifies the r.f. current and runs it through a Resistor, which makes the d.c. voltage drop out of it — that's the bias. The stronger the signal the greater the drop, and therefore the higher the bias on my grid — consequently the less I amplify that particular signal."

* Editor, *QST*.

"I see. In effect the signal controls itself by its own pressure."

"Correct."

"One thing isn't quite clear, though. The signal from which this bias is produced — Detector Tube receives it from you, doesn't he?"

"He does."

"But if you've already amplified it and made it larger, how can the bias made *after* it leaves you enable you to control its level?"

"Well, the first few cycles when the signal starts up aren't controlled, that's true. They go through at full amplitude. But once the bias they make comes back from Detector Tube it holds down the next lot of cycles coming after, and so on. The system works a little in arrears, of course, but the delay is so small — only a fraction of a second, actually — that I hardly notice it."

"I see. But what about those succeeding cycles? Since they are cut down in amplitude they won't be capable of building up as much bias as the first ones, will they?"

"No, but they do produce enough to keep the average level under control. If the signal gets too strong it only makes more bias and makes things tougher for itself. On the other hand, if it gets weaker it makes less bias and so I give it more of a lift before I send it along."

"I understand now. Thanks for explaining."

"Not at all. Anything else you want?"

"Only if you can tell me any lead that might help us find out who killed the Signal. Have you observed anything suspicious?"

"Not a thing — except of course that Mixer Tube wasn't changing the frequency of the Signal for a time. But I understand you discovered the cause of that."

"Yes — it was that poor little Output Coupling Condenser. I really felt sorry for her."

"Too bad," I.F. Tube replied mechanically.

"Signal Generator's artificial signals come through to you okay now, I take it?" the Sleuth inquired after a pause.

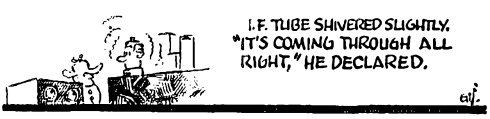
"How can I tell? He hasn't sent any up since you wired for that new Coupling Condenser. I don't even know if she's on the job yet."

"Hmmm. Well, she's *supposed* to be on the job. Anyway, it shouldn't take long to find out."

Cupping his hands, Sleuth called down to Signal Generator, squatting on the floor below. "Send something up here to see if I.F. Tube gets it all right, will you?"

"Okay!" the stocky undercover man yelled back. "Just a second while I get organized here." Signal Generator gripped Antenna's terminal with the pincer-like fingers of one hand and took hold of the Ground terminal with the other.

I.F. Tube waited silently. Signal Generator's round button-like nose seemed to revolve and a clicking noise issued from his interior as he changed frequency. A few seconds passed, and then I.F. Tube shivered slightly. "It's coming through all right," he declared. "Plenty strong, too — almost knocked me over. Tell him to take it easy!"



"All right — that's enough," the Sleuth called down. "I.F. Tube can't take it — you're overloading him. Anyway, you're getting through this far now."

The Sleuth glanced up toward Speaker's housing, but Output Meter wasn't visible from where he stood. Noting the glance, Volt called up: "No — Output Meter didn't get it."

"Well, we're making progress, anyway," the Sleuth rubbed his hands in satisfaction. "Now about that I.F. Transformer in your plate circuit? Any reason to suspect him?"

"No, sir!" I.F. Tube declared emphatically. "I've worked with him for a long time now and he's as dependable as they come. Always stays in tune whether it's wet or dry, cold or hot. They don't come any better."

The Sleuth's curiosity was aroused. "I don't understand. What difference would temperature and humidity make to him?"

"I just said — it doesn't. But a lot of these Transformers are temperamental fellows. Being descendants of the Coil and Condenser families, you know, they've inherited the weaknesses of both. With Coils, it isn't the temperature — it's the humidity; when their windings get wet their resistance goes up. The Condensers are bothered more by temperature. You'd be surprised how much their capacity changes if it gets too hot or too cold. We lose a lot of energy that way."

"But you say I.F. Output Transformer is all right?"

"Oh, he's all right. You won't find him getting out of line."

"Well, I guess I can take your word for it."

With a parting word to I.F. Tube the Sleuth returned to the group below. He spread the circuit diagram flat on the floor.

"Here's the way it stands now," he said. "We've worked back from Loud Speaker through Output Tube and in from Antenna through the I.F. family — and that narrows it down to this one stage that's left."

"Detector Tube II and that flock of Resistors and Condensers he's tied up with," Volt observed reflectively.

"You missed this fellow here. What about him?" Ohm broke in.

"Beat Oscillator Tube? Why, he isn't even located on the path the Signal takes," the Sleuth objected.

"Maybe not, but that doesn't mean he couldn't have sneaked over and done it," Ohm persisted. "I'll bet you don't even know what his job is."

"No, I don't," the Sleuth admitted. "But I'll find out, if necessary. First, though, I'm going to have a talk with this Detector II fellow."

Returning to the chassis, he found Detector Tube II standing alone near the rear apron. His body, dull black except for the shiny metal grid cap perched squarely on the top of his head, was much like that of the other metal-jacketed tubes.

"You know, of course, that I'm investigating the death of the Signal," the Sleuth began.

"No, I don't know that. Why should I?" Detector Tube retorted belligerently.

"I thought by now everybody on the set knew."

"Well, I'm no eavesdropper and I don't go in for gossip," Detector Tube replied smugly.

"But you did know the Signal was dead?"

"No, I didn't know that, either. I figured something must have happened when we laid off work, but whether it was labor trouble or a shortage of raw material I didn't know."

"I see," the Sleuth remarked thoughtfully. "Well, the reason was that the Signal is dead — killed by some part here on the set."

"Okay — the Signal is dead. So what?"

"Why," the Sleuth observed mildly, "if you haven't been keeping up with current events you probably won't be able to give me any clues, but it will help if you'll tell me about your work for the set."

"Why should I?"

"Because it may bring a killer to justice," the Sleuth replied sharply.

"That's no skin off my teeth," Detector Tube shrugged.

"But you may be able to supply just the clue we need," the Sleuth argued. "Surely a Part of your standing and importance wouldn't fail in his duty to the public interest?"

The appeal to Detector Tube's vanity succeeded. "Well, if you put it that way —"

"I do," the Sleuth assured him solemnly.

"I suppose you've already heard a lot about me from these other Parts. I'm the most important part in the set — the heart of it, really. I'm actually two Tubes in one — a diode-triode, the only one here. First my diode translates the Signal into audio frequency so that you ordinary mortals can understand it, and then my triode section amplifies the a.f. voltage so that clumsy oaf Output Tube can work his grid with it."

"I'm particularly interested in your diode section," the Sleuth prompted.

"That's the smallest part of me, but it's the part that gives me my name. Although a better name would be 'demodulator,' since that is actually what I do — strip off the modulation brought in on the Signal's r.f. carrier."

"This carrier — I don't believe I'm familiar with it. What is it? Something like an airplane carrier?"

"No, although as a rather far-fetched analogy you might compare a radio signal with an airplane. The propellor, turning over very rapidly with respect to the movement of the ship itself, compares with the high-frequency radio carrier, while the airplane proper is the relatively slow modulation accompanying the carrier."

"Afraid I don't get it," the Sleuth apologized.

"It probably doesn't matter," Detector Tube shrugged. "All you need to know as far as this case is concerned is that the r.f. signal is of no particular value in itself. It's like an envelope that comes through the mail. Until you open it and get at the letter inside it doesn't mean very much. Well, my job is to open it and take out the message."

"How do you do that?"

"Oh, I just rectify it. You see, modulation — amplitude modulation, that is — merely represents a variation in the amplitude of successive cycles of the incoming signal. My diode rectifies these r.f. cycles and makes pulsating d.c. out of them. A small amplitude produces only a small amount of current while a large amplitude gives a lot of current. The rectified diode current therefore duplicates the modulation amplitude; in other words, it reconstructs the modulation originally put on the signal."

"Your work is much the same as that of Rectifier Tube, then?"

"Well, yes — on the same relative scale as a wrist watch and a grandfather's clock. My little diode patch is similar to his plate in that the electrons can flow only from the cathode to the plate and only when the plate is positive — which means that on the negative half of a cycle no current flows at all."

"Resulting in that pulsating d.c. you mentioned," the Sleuth assented. "Then what?"

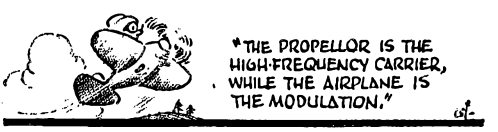
"You understand that I.F. Output Transformer delivers the Signal to me from his secondary, with one end connected to my diode patch and the other to my cathode through Diode Load Resistor. As I say, the positive half-cycles cause a pulsating current flow which travels through the entire circuit, including my diode, the secondary winding, and, of course, Load Resistor. When it goes through the Resistor he makes voltage out of it — and naturally that voltage also varies directly with the modulation."

The Sleuth referred again to his circuit diagram. "Ah, yes. And then I suppose that voltage charges the Diode Coupling Condenser here at Load Resistor's head. But what about this R.F. Filter Condenser in parallel with Load Resistor?"

"Oh, she simply drains off the r.f. current to ground after it has gone through my diode. You see, all we're interested in is the audio-frequency modulation, and once we've got that we don't need the r.f. any longer; in fact, we have to clean it out of there so it doesn't mess up the a.f. voltage. R.F. Filter Condenser just by-passes it to ground, letting the audio go through."

"Quite so. Now what about this other lead from the top of Diode Load Resistor running back to the I.F.?"

"That's the lead which carries the d.c. biasing voltage for the a.v.c. system."



"Oh, yes — the a.v.c. I.F. Tube told me about that. I see it has a group of Resistors and Condensers in it, too. Another filter circuit?"

"Exactly. This filter strips off both r.f. and a.f. and leaves only the d.c. for a.v.c. bias."

"Good enough. Now let's get back to the a.f. circuit. I see that Diode Coupling Condenser carries it over to another Resistor — a peculiar one, with three arms."

"Yes — that's Volume Control Resistor. He's a sort of dispatcher or traffic control man. Some-

times, you see, we deliver quite a bit more a.f. voltage than Output Tube needs to produce the volume he's called on to deliver. Volume Control routes just enough of the a.f. to Output Tube's grid to supply his needs."

"What does he do with the rest of it?"

"What does any Resistor do with current? He dissipates it — not that it does him any good, either. It just happens to be his job. I don't think I could stand it, myself. Some day I'd just tell those people out there to go chase themselves and give 'em the maximum output regardless."

The Sleuth's face came alive. "Aha!" he said. "Maybe we've got something there. Any chance that Volume Control felt the same way?"

"What do you mean?" Detector Tube parried.

"I mean, could he have become disgusted with his job and suffered a breakdown or something?"

Detector Tube moved uneasily. "I don't follow you. What I said was I'd give 'em *all* the Signal — that is, if I was Volume Control and got fed up with eating all their surplus junk."

"It could be the other way, too, though, couldn't it?" the Sleuth argued. "Couldn't he simply quit and refuse to send them any?"

His eyes shifting nervously, Detector Tube paused before replying. "No, I don't think so," he answered finally. "You see, I happen to know what his output is. Of course, initially he gets the voltage from my diode, but then he sends it back to me for my triode section. And as I recall he kept on delivering right up to the time the Signal failed."

"Then I take it —" The Sleuth paused abruptly. There was a different note in his voice. "Are you trying to tell me that the Signal failed — that it was killed before it reached your diode?"

"Why, yes. It —"

"Then I say you're lying," the Sleuth told him uncompromisingly. "We *know* that every part in the circuit is working right up to the diode. The Signal couldn't have been killed before it reached there."

"Oh, but you don't understand," Detector Tube answered hurriedly. "Let me explain. You see, I — that is, we've been talking about a *modulated* signal — any signal — just for the sake of illustration. I've been explaining how I'd demodulate such a signal and take off the audio frequency. But the Signal that was killed was unmodulated and there wasn't any a.f. on it."

The Sleuth stared. "First I've heard that about the Signal," he said doubtfully. "I'll listen to what you have to say, though."

Detector Tube pressed eagerly on with his explanation. "No, the Signal was a plain c.w. carrier — a code signal — starting and stopping in pulses to form dots and dashes. It had no audio modulation on it at all."

"How could anyone hear it, then? A radio-frequency carrier isn't audible to the ear."

"That's just the point! It had to be heterodyned with another signal from a local oscillator to produce a combination beat voltage at an audible frequency, so it could be heard."

"Like Oscillator Tube and Mixer changing the Signal's incoming frequency to the intermediate frequency, eh? Except that in this case the intermediate frequency was changed into an audio frequency."

"That's it exactly. And that's what happened to the Signal — there was no heterodyning voltage, and so it couldn't get through."

"What happened to the heterodyne voltage?"

Detector Tube spread his palms and looked blank. "I don't know. There just wasn't any. It's B.F.O. Tube's job to supply the voltage, and he hasn't been doing it."

"B.F.O. tube, eh? That does put a different complexion on the case," the Sleuth conceded. "All right — I'll look into it. But you stay right here where I can find you if I want to."

Relief spread over Detector Tube's saturnine face. "Of course," he promptly agreed.

Rapidly the Sleuth covered the short distance to a small raised platform which he had already identified as Beat Frequency Oscillator Tube's location. There B.F.O. Tube lived with the other members of his department — several Fixed Condensers and Resistors, and a queer fellow called Beat Oscillator Coil who maintained a veritable harem of midget-sized Variable Condensers.

B.F.O. Tube, slow-moving and imperturbable, listened noncommittally while the Sleuth repeated Detector Tube's charges.

"Well, haven't you anything to say for yourself?" the Sleuth demanded irritably.

"No. What should I say?"

"Did you or did you not kill the Signal?"

"I haven't anything to do with the Signal. All I do is supply oscillator voltage to the circuit when they turn the switch on. I don't know what they do with it and I don't care."

"But *are* you supplying the voltage? Didn't you stop delivering it awhile back? Detector Tube claims you did."

"Let him prove it."

"Oh, so you're going to be tough, are you? Well, we'll see about that," the Sleuth retorted. "You just wait here — I'll be right back."

He strode menacingly down the chassis. Reaching the lower level, he looked around for Volt and Milly. They were not in sight.

(Continued on page 74)

COMBINED RECEIVER-CONVERTER-CODE OSCILLATOR-INDUCTION TRANSMITTER

THE piece of apparatus to be described was originally intended merely as a short-wave converter to be used with a b.c. receiver by a would-be ham friend for code practice in his office. However, after assembling the converter, I decided that the ham shack needed a simple 'phone-c.w. monitor. So we added the 6C8G, using one section as a regenerative detector, transformer-coupling it to the amplifier section. Although intended for headphone operation, the output was sufficient to operate a 5-inch p.m. speaker at comfortable volume on c.w. reception.

After studying Vernon Chambers' article in *QST* for March, 1942, "Making Use of Induction," it was decided that the amplifier section of the 6C8G would serve admirably as a modulator for the oscillating regenerative-detector portion of this tube and thereby provide us with an induction transmitter. The microphone transformer was therefore fastened to the back of the small chassis which, by this time, was accommodating considerably more components than the manufacturer intended.

By the simple expedient of feeding the plate output of the amplifier section to the grid through a 0.002-μfd. mica condenser at the audio transformer terminal, we had a code practice oscillator which provided sufficient volume for a large room and permitted induction transmission of a modulated c.w. note.

The power supply is of the conventional transformerless type, a full-wave voltage doubler. The addition of the 0.002-μfd. mica condenser across the 25Z5 plates was found absolutely necessary and is, in effect, a substitute for the conventional by-pass across the a.c. line commonly found in line-powered receivers. Although a 10-henry, 40-ma. filter choke is specified, we substituted a small speaker transformer, using the primary winding only, and the result is entirely satisfactory.

The construction arrangement will vary in each individual case and is entirely dependent upon the size of components on hand. Our supply of chassis included one of 9 × 3 × 1½-inch size. By utilizing every available square inch of surface, we succeeded in mounting everything except C_3 and C_{19} on the chassis, the latter two items and the line switch being fastened to the panel.

The 140-μμfd. condensers across L_1 and L_3 were

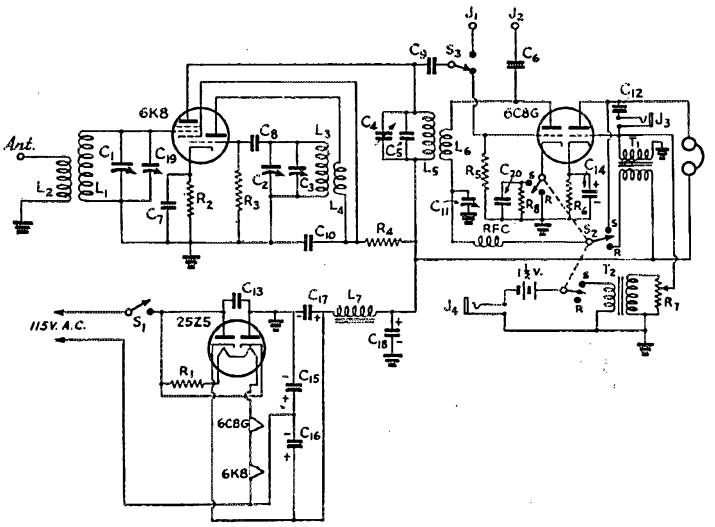


Fig. 1 — Circuit diagram of W8WHE's receiver-converter-code practice oscillator-induction transmitter.

C_1, C_2 — 140-μμfd. variable.
C_3 — 35-μμfd. variable.
C_4 — 3-30-μμfd. trimmer.
C_5, C_6 — 200-μμfd. mica.
C_7 — 0.05 μfd.
C_8, C_9 — 100-μμfd. mica.
C_{10} — 200 μμfd.
C_{11} — 100-μμfd. variable.
C_{12}, C_{13} — 0.002-μfd. mica.
C_{14} — 25-μfd., 25-volt electrolytic.
C_{15}, C_{16} — 16-μfd. electrolytic.
C_{17}, C_{18} — 8-μfd. electrolytic.
C_{19} — See text.
C_{20} — 10-μfd. electrolytic.
R_1 — 250-ohm line cord.
R_2 — 250 ohms, 1 watt.
R_3 — 50,000 ohms, ½ watt.
R_4 — 25,000 ohms, 10 watt.
R_5 — 1 megohm, ½ watt.
R_6 — 1500 ohms, 1 watt.
R_7 — 0-5-megohm potentiometer.
R_8 — 1000 ohms, 1 watt.

L_1, L_2, L_3, L_4 — See coil table.
L_5 — 65 turns No. 30 d.s.c., close-wound on ¾-inch diameter form.
L_6 — 22 turns No. 30 d.s.c., close-wound on same form as L_5.
L_7 — 10-hy., 40-ma. filter choke (see text).
J_1, J_2 — Tip jacks (output coupling for b.c. antenna and transmitting antenna, respectively).
J_3 — Open-circuit keying jack.
J_4 — Open-circuit microphone jack.
S_1 — S.p.s.t. toggle.
S_2 — 3-p. d.t. switch.
S_3 — S.p.d.t. toggle.

RECEIVER COIL DATA

Coil	Grid Winding (L_1 and L_3)	Antenna (L_2) or Tickler (L_4)
A	56 turns No. 22 enameled	10 turns No. 24 enameled
B	32 " " " "	8 " " " "
C	18 " " " "	7 " " " "
D	12 " " " "	7 " " " "
E	10 " " " "	8 " " " "

All coils wound on 1½-inch diameter forms (Hammarlund SWF-4). Grid windings on coils B–E, inclusive, are spaced to occupy a length of 1½ inches; grid winding on coil A is close-wound. Antenna-tickler coils are all close-wound, spaced ⅛ inch from bottom of grid winding.

Frequency Range	Coil at L_1-L_2	Coil at L_3-L_4
1700 to 3200 kc.	A	B
3000 to 5700 kc.	B	C
5400 to 10,000 kc.	C	D
9500 to 14,500 kc.	E	D

made by removing all but four rotor and five stator plates from a two-gang b.c. condenser. A trimmer condenser, C_{19}, was found to be necessary across L_1 to peak signals properly and a small air padder obtained from an old i.f. transformer served the purpose. The 3-30-$\mu\mu$fd. mica trimmer across L_5 will be needed to spot the intermediate frequency (which is also the transmission frequency) at a point of least local interference.

Cathode bias was originally omitted from the regenerator section of the 6C8G but the switching arrangement, suggested by W9MZK, now includes R_8 and C_{20} to place the operation on the proper position of the tube characteristic curve for modulated operation and improve the quality of the transmissions somewhat; however, serious distortion will not result from their omission.

The pin-jack, J_1, serves as a means of connecting the output of the 6K8 mixer to the antenna terminal of a b.c. receiver, utilizing the b.c. receiver as an i.f. amplifier for the h.f. signals picked up on the converter.

Should any antenna be required for induction transmission, a short piece of wire (a few feet at most) can be connected to the second pin-jack, J_2.

A three-pole, double-throw switch serves properly to connect the microphone battery, add cathode bias to the oscillator section of the 6C8G, and feed the modulator plate output into the plate circuit of the oscillator for transmission. The potentiometer, R_7, serves as both microphone gain control and volume control for the receiver.

A 5-inch p.m. speaker was mounted sidewise at the right-hand side of the chassis and the entire apparatus housed in a "tailored-to-measure" wood cabinet, 12¾ × 6¾ × 6¾ inches, which allowed space for microphone battery, headphones, key, and a small single-button carbon mike. A hinged back and chromium carrying handle bolted to the cabinet, which had been given two coats of aluminum paint were added as final touches. The result is a compact piece of equipment ready to be carried to the next code session or set up in the nursery to detect the jr. op's wails while the OM and XYL are entertaining downstairs or visiting next door, using the induction transmitter feature. The b.c. set at the receiving point would, in this case, be set to the frequency of the jr. op's "half-watter."

A word of caution — the FCC regulations for operation of equipment of the nature of this induction transmitter (which incidentally does not require a license) specify that the signal strength shall not exceed 15 microvolts per meter at a distance equal to the wavelength divided by 2π, or, roughly, the maximum workable distance in feet should not exceed 157,000 divided by the frequency in kc. This means a maximum range of 100 feet, or less, for a frequency of 1600 kc., the approximate i.f. and transmitting frequency.

Coast-to-coast c.w. stations and even foreign 'phone stations have been copied, using a fifteen-foot piece of indoor antenna wire connected to the receiver. — *Jule E. Burnett, W8WHE.*

A CONTROL FOR HIGH-POWER RIGS

BACK in the good old days I found it just about impossible to obtain a relay capable of

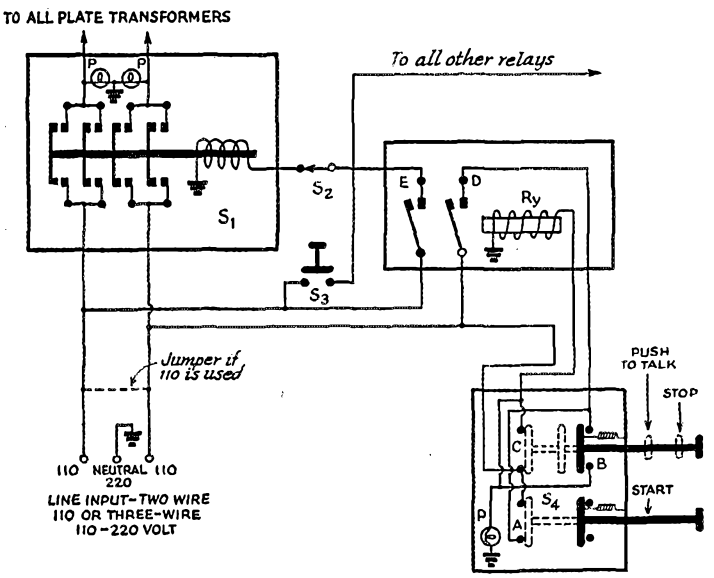


Fig. 2 — Transmitter control for high-power rigs.
P — Warning light.
R_y — Double-pole relay, normally open.
S_1 — 3-phase, 5-h.p. contactor-type motor starter.
S_2 — S.p.s.t. toggle switch.
S_3 — Push-button type switch for testing.
S_4 — Push-button type control for S_1.

handling the inductive load of the primaries of the plate transformers in the big rig. Finally I succeeded in picking up a three-phase 5-hp. motor starter of the contactor type, together with the usual push-button control. By adding a small double-pole relay it was possible to provide for "push-to-talk" operation, as well as control, with a minimum of wiring complications. Provision was also made for the operation of signal lights at the operating position. The circuit is shown in Fig. 2. The system will work on either the three-wire 115–230-volt lines or on single-phase 115-volt circuits. If the rig is operated from the latter, the jumper indicated by the dotted lines should be used.

Referring to the diagram, momentary closing of contacts A of S_4 by the starting button closes the circuit to the coil of the relay, R_y, causing contacts D to short-circuit and starting contacts A, and to hold the relay closed through the stopping contacts B. When R_y closes, it actuates the power contactor, S_1, through the relay contacts, E. When the contacts at B are broken by pushing the stopping button half way, the circuit through the relay winding is broken, R_y opens, opening the power switch, S_1, and also opening the holding contacts, D.

When the stopping button is pushed all the way in, contacts C close the circuit to operate the relay, but since contacts B are open, the holding circuit through the relay contacts D are open and the holding circuit does not operate. In this manner, the system may be operated for "push-to-talk" communication.

S_2 is a safety switch located at the transmitter, which, when open, prevents application of the power from the operating position. S_3 is a push-button type switch, also located at the transmitter, for tuning. — *Alvin U. Haugen, W9PRZ.*

Our Cover

FOR the second year the United States Flag waves over a nation at war as the anniversary of American Independence Day approaches, and again *QST* joins the other national magazines proudly flying the colors in tribute to the men and women in our armed forces who are laying their lives on the altar of freedom.

The cover on this issue carries a multiple meaning. Symbolizing the amateur antennas of the country, standing still and silent now while their owners join in the fight to preserve the Flag which flies protectingly above, there is added significance to that rotary array (a ¼-inch scale model of a three-element 14-Mc. beam by W1GS) in that it typifies the ham experience which qualified its now-absent owner for his vital new role.

Not to be forgotten is the reminder carried on behalf of the sponsor of the Flag Covers — the U. S. Treasury Department — that without War Bonds and Stamps we can't have war bombs and tanks, and that we cannot hope to take up again the tools of peace until we have first provided the tools needed to finish the job of war.

Elementary A. C. Mathematics

(*Continued from page 48*)

allel circuit acts like a simple resistance and no reactive effects are exhibited to the source of voltage. For the values assumed this occurs when the inductive reactance is 176 ohms, giving a line current of 0.301 amp. with 100 volts applied. The impedance is 332 ohms and is purely resistive.

If the inductive reactance is allowed to increase from a relatively low value, the line-current vector moves along the locus from T toward S. At first the length of the vector decreases — that is, the line current decreases — but after passing through a minimum the length of the vector increases with further increase in inductive reactance. The minimum current occurs when the vector is approximately in the position I_A, and since the voltage is fixed this point on the locus must represent the conditions under which the parallel circuit has its highest impedance. We can, if we wish, say that the parallel circuit is "resonant" when its impedance is maximum. In this example the maximum-impedance point occurs with an inductive reactance of approximately 260 ohms, when the line current becomes 0.234 amp., the phase angle slightly over 32°, and the impedance 427 ohms. If the inductive reactance is changed appreciably from this value in either direction the impedance will decrease.

Thus we have two methods of defining resonance, one on the basis of zero phase angle or a purely resistive circuit, the other on the basis of maximum impedance. The value of the variable reactance is *not* the same for both cases, and neither form of resonance occurs when the inductive and capacitive reactances are equal. On the other hand in a circuit like that of Fig. 36, where it is assumed that there is no resistance in series with either the condenser or coil, the phase angle *is* zero and the impedance *is* maximum when the inductive and capacitive reactances are equal. The presence of series resistance evidently causes the two possible resonant conditions to occur at different values of reactance. However, if the resistance is quite small — say less than 1/10 or 1/20 the reactance — it is possible to assume without undue error that the circuit is resonant when the reactances are equal. Since a tuned r.f. circuit usually meets this condition it is customary to call the circuit "resonant" when the capacitive reactance equals the inductive reactance.

Strays

We record with keen sorrow the sudden death on May 23rd of James J. Freeley, General Manager of the National Company. Jim was widely and affectionately known among radio amateurs and throughout the radio industry. Burdened by the problems of large-scale war-time production of military radio equipment, he worked too hard and too long. Jim's multitude of friends will number him among those who sacrificed their lives for the preservation of democratic freedoms.

CORRESPONDENCE FROM MEMBERS

The Publishers of *QST* assume no responsibility for statements made herein by correspondents.

"SUBSTANTIAL AID"

1001st Tech. School Sqn., AAFTTC
720 S. Michigan Blvd., Chicago, Ill.

Editor, *QST:*

It gives me great pleasure at this time to report that the efforts of the American Radio Relay League, in aiding this station to complete its quota of civilian radio instructors, were remarkable. Only with the substantial aid of your organ, *QST*, could such an enterprise have been accomplished, considering the requirements necessary and the limited number of qualified applicants at the late date at which we started.

We are indeed grateful to have been able to enlist your coöperation and support during the "infancy" of our school, and to be able now to report that our need has been completely filled.

You should be justly proud of your expansive circulation, and of the response by a great number of the many members of ARRL to your urgent pleas in our cause. . . .

— *Capt. John T. Gilmore*

HAM HOSPITALITY

Armed Guard Center, Treasure Island,
San Francisco, Calif.

Editor, *QST:*

I feel it is my duty as an American ham to pass along this warning to all my fellow amateurs in and around our good ol' U.S.A.

Stay away from the New Zealand hams! That is, unless you want to meet a swell gang of fellows, have a good bull session and beer afterwards. If you don't like this kind of treatment, stay away from there. Because that is the way they treat visiting hams in that part of the world!

Our ship pulled into Christchurch early one morning and I soon got acquainted with Pratt, ZL4AF, a port radio inspector. He passed the word along to some of the other hams that I was in port, and by two o'clock that afternoon I had been invited to Jack Freeman's, ZL3FB, for "tea" (supper to youse guys). After having eaten cold storage chow for three months and not talking to a ham for the same length of time, you can imagine whether or not I accepted!

Let me say at this time, to all hams, if you are ever in Christchurch find Jack Freeman and somehow make him invite you to his home for "tea." Mrs. Freeman (Jack's XYL) really knows how to fix a meal fit for a hungry ham. Cooking isn't her only quality. She knows how to make a fellow feel welcome, too.

Well, after we had eaten in came the rest of the gang: Jimmy Strackan, ZL4AF, Clarie Hughes, ZL3CA, Fred Walter, ZL3DJ, Bob Stanton, ZL3AZ, and E. Pratt, ZL1GU. From then on it was just another good old hamfest. (I guess hamfests are the same the world over.) We discussed everything from beam antennas to what makes those haywire rigs of ZL3DJ's work. (He's the DX king of South Island.)

Mrs. Freeman brought cakes and tea, so we ate all over again, and a little later we started on the beer. Then came more discussions on other items such as frequency modulation, the price of parts, the war and world politics. I had taken my *Handbook* along in case any argument came up, but it was a wasted gesture. Those fellows know all the answers and practically all the questions.

Most of the ZL hams are in the service, but those few who are left are doing all in their power to keep the spirit of amateur radio alive. They still hold meetings regularly, even when only two or three fellows can attend. I hope the fellows in the States are doing as much. In my opinion, now more than ever before we all have to do everything in our power to keep the greatest hobby and pastime going.

Well, now that I have warned all you guys and gals of the pitfalls of New Zealand, I'll sign off. Here's a toast to a swell gang — the New Zealand hams! We Americans will be seeing you on ten and twenty immediately after we ground out the Axis.

One added thought: Due to some law concerning finances the fellows there are not allowed to send money out of the country; consequently they can't get *QST*, the *Handbook* and other publications. So if any of you happen to head that way, take what you can with you in the line of publications.

— *C. E. Ballard, RM1c, USNR, W5IXT*

BY V-MAIL FROM NORTH AFRICA

APO 700, c/o Postmaster, New York, N. Y.

Editor, *QST:*

I am now in North Africa. . . . *QST* is still coming through and is a most pleasant contact with home and the good old days before the war. It's going to be a great day when the bands open up again, and I think they are going to be much more crowded than ever what with the amount of radio men in the Signal Corps. I cannot tell you what I am doing except to say that it is radio and very interesting. I now have the opportunity to do many things I once wanted to but could not because of lack of equipment and funds.

The *Handbook* sure is getting a workout. It is the only practical book available. I think there

are more *Handbooks* than Bibles over here. And to a good radio man the *Handbook is* the bible!

Continue to send me *QST* and I will be happy. Incidentally, my company commander is a radio man (Capt. Robert Brady, W2JXG). . . .

— *Lt. Normand E. Tetreault, W2OPH*

CONVENTION IN CAIRO

American Legation, Beirut, The Lebanon

Editor, *QST:*

. . . In Cairo in early September, W. E. Marsh, SU1WM, advised me of his plan to hold a convention of amateur radio operators in December, if enough interest were shown. Support was enthusiastic, and on the 19th of December I flew to Cairo from my post here to attend the meetings on that date. There was an informal luncheon meeting from 1100 to 1300 hours at the Britannia Restaurant, attended by 30-odd radio amateurs. At the evening meeting, 53 men who held pre-war amateur licenses in seven countries dined at the Britannia. Both meetings were largely given over to informal ragchewing and the consumption of beer, food and what-not.

To the best of my recollection, the following countries were represented: Egypt, England, Canada, New Zealand, Scotland, Wales and U. S. A. The latter was represented by four men: Ken Boothe, W5PJ, of Cairo branch, U. S. Office of War Information; Charles C. Miller, W8JSU, of Beirut branch, U.S.O.W.I., and two soldiers. I think it may be inadvisable to say more than that they were a W4 and a W8.

Marsh, SU1WM, read a letter of good wishes from J. Clarricoats, G6CL, secretary of the RSGB, and expressed, on behalf of the committee, his appreciation for the interest and support of the amateurs now in the Middle East. Many other amateurs, now serving in the armed forces of Australia, South Africa, etc., were unable to obtain leave to come to Cairo on the 19th. Marsh expressed his sorrow at not having undertaken sooner such an affair, as support was instant. The assemblage voted to make the convention a semi-annual affair, and, after posing for a photo by SU1AX, departed. . . .

I'd be awfully glad to hear from any of the gang back home. Mail here is scarce, and all letters will be answered.

— *Charles C. Miller, W8JSU*

FROM ONE ANONYMITY TO ANOTHER

Kippering-on-the-Charles, Mass.

Editor, *QST:*

The technical standard of *QST* has always been so high that I was somewhat amazed to find that you would accept such an ill-considered article as Sourdough's "That's the Limit!" Whether his mental lapse is due to going without shoes for such a long time or from having his raw meat ration cut to a few pounds a week is beside the point, but he should realize that his proposed system would be effective only when the transmitter signal is within the pass band of the crystal filter circuit and hence affords no protection if the signals should *jump* over the legal limit. The different limits of the various bands would require separate crystals, and the bands above 7 Mc. would present a serious problem unless good fundamental crystals for them were available.

How, then, to achieve the desired result? It so happens that the very same problem has been under consideration in my laboratory here, and I have two solutions to it. The first bears a slight resemblance to Sourdough's proposal, but instead of crystals at each end of the band we use discriminator circuits whose mid-frequencies correspond to the band limits. The discriminator tuned to the low-frequency limit of the band is connected to give a positive signal for *lower* frequencies, and the discriminator at the high-frequency end is connected to give a positive signal for *higher* frequencies. The output of each discriminator is coupled directly to separate pentodes whose common plate circuit contains the sensitive relay, and each pentode is biased to a point just below the plate-current value which trips the relay. The operation is obvious. Any signal within the band limits gives negative signals from the discriminators and hence has no effect on the relay, but a signal outside the band limits gives a positive signal which increases the plate current of one of the pentodes and trips the relay. The discriminators will work over a much wider range than will the crystals and hence afford protection even if one has drifted 40 or 50 kc. outside. The discriminator circuits use low-drift components and are checked frequently by reference to a 100-kc. oscillator. The relay rings a gong at the same time that it cuts off the transmitter, in case the operator has been dozing.

The second solution requires the use of a panoramic-reception receiver and a 100-kc. oscillator to furnish band-limit marker pips. Its operation is obvious, and its advantage is that it gives a visual indication at all times.

We trust these suggestions will save Sourdough's time in keeping him from following a fruitless line of research.

— *Larsen E. Rapp, ex-W1OU*

EDITOR'S NOTE. — For the benefit of the unwary, Larsen E. Rapp, ex-W1OU, should be identified as the perpetrator of the April Fool story on "dynamic prognostication" in April, 1941, *QST*. However, note that this is July.

QRK 5

408 West Defee, Goose Creek, Tex.

Editor, *QST:*

. . . I want to tell you how much I like your serial, "Who Killed the Signal?" In its simplicity it is a very good description of what goes on in a radio set. It has been a great help to me while trying to teach my wife the fundamentals of radio.

Keep up the good work.

— *R. F. Dial, jr.*

2819 61st Ave., Oakland, Calif.

Editor, *QST:*

As I have found theory tough to master, I must compliment you on your story, "Who Killed the Signal?" Good, enjoyable reading and, for one like myself, a very simple course in theory. Please keep it up.

— *Edward J. Downey, sr.*

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63 Forest St., Medford, Mass.

Editor, *QST:*

"Who Killed the Signal?" is swell. Keep it going. Don't let the Sleuth find the trouble. . . .

— *E. L. White*

Burleson, Texas

Editor, *QST:*

A word of congrats to you and Clint DeSoto for the swell story, "Who Killed the Signal?" I can hardly wait for the next issue of *QST*. . . .

— *Bob Bransom*

Chicago, Ill.

Editor, *QST:*

. . . "Who Killed the Signal?" . . . [is] not only most interesting but very instructive and a valuable aid in the radio theory classes I am taking. I hope you will find it convenient to make this story available under one cover at an early date. I am sure that other beginners will find it equally helpful.

— *James C. Donze*

EDITOR'S NOTE. — The Sleuth, naturally helpfully inclined as well as a bit of an exhibitionist, is always willing to have other struggling searchers benefit from the lessons learned in the course of his investigations. Just the other day he was called out on another case, this one involving a defunct transmitter. He hasn't solved it, yet — but he's confident, as always. And he's willing to have his discoveries as they occur reported to the readers of *QST* — if you want to read about them, that is. Hw?

SOS TO U.H.F. EXPERIMENTERS

4000 S. Figueroa St., Los Angeles, Calif.

Editor, *QST:*

Will you and your organization consider this letter in the light of an SOS?

The National Schools are engaged in an extensive Army communications training program involving the training of soldiers from all branches of the armed forces in the basic fundamentals of radio communications as applied to modern warfare.

Along with this training program experiments are being conducted in the ultrahigh-frequency spectrum (225 Mc. and above), in both television and frequency modulation systems. The Army has also granted us three frequency bands for use in demonstrating transmitter tune-up procedure.

Definite laboratory records are being kept which may be of use to the amateur fraternity at the conclusion of hostilities, and it is the belief of the writer that an interchange of ideas between the men who have been experimenting along these lines as amateur operators and the developments of ideas in our laboratory as we progress will be of mutual benefit to both.

Would you, through *QST*, ask those of your members who have data on the above subjects, and who wish to exchange ideas, to communicate with the undersigned?

— *Clifford J. Maddock*

"VERY REAL HELP"

10 Soundview Circle, White Plains, N. Y.

Editor, *QST:*

I was up at New Haven to-day and, to make a long story short, I was hired as radio instructor by the Army Air Forces Technical Training Command, at Yale. . . .

So you may take my name off the list of those seeking employment and add it to those who have found a job through the efforts of the ARRL.

It is a big step for me to take as I have been in my present work all my working life and this will be my first real change.

I cannot begin to thank the ARRL for making it possible for me to find this job. It is just what I wanted and I feel sure that I will be very happy in my new work. I have been a member of the ARRL for a matter of only a few months and thus I feel all the more grateful for the very real help that you have been to me.

— *Stephen T. Van Esen*

WITH PRIDE—OR SOMETHING

APO 860, c/o Postmaster, New York, N. Y.

Editor, *QST:*

. . . Maybe this will fill you with pride or something. Anyway, I have a set of McGraw-Hill radio engineering books. And, do you know, one of the most useful things to me is not to be found in them but in the *Handbook*. It is the complete listing of tubes and base-connection charts. I will probably be kicking myself all over creation for the duration for not bringing my own *Handbook* along with me. Luckily, someone else came to my detachment later on who had one. . . .

Have just been looking at my first *QST* in over a year. I'm going to have to figure out a way to get the 1943 issues. (Guess I'll have to get a double subscription — one sent home and the other sent to me here. Probably won't get all issues here; some might go to the bottom.) When I looked through this *QST* it reminded me of previous days, when I could try out some of the ideas. Now I can't, and it makes me a bit disgruntled or something. . . .

— *S/Sgt. L. J. Smith, W9EEZ*

OPERATING NEWS

GEORGE HART, W1NJM
Acting Communications Manager

CAROL A. KEATING, W9WWP
Assistant Communications Manager

Operating Procedure. Judging from the conduct of CD-WERS tests we have heard, this subject needs some discussion. Let us begin by saying again that CD-WERS is not ham radio, nor a substitute therefor, and that even during tests, when no set form of operating procedure can be followed, communications should be made to sound businesslike and official. The astonishing part of this theme is that operators trained for this specific service, who have had no previous experience before the mike, are usually the ones who take it more seriously. The offenders in this respect are amateurs — men who either cannot or don't try to throw off the haphazard operating techniques they have acquired through years of incorrect amateur operation.

If you are participating merely for the fun of it, because it gives you a chance to get back on the air and exercise your tonsils, then WERS has no place for you unless you're willing to mend your ways. You will do your country, yourself, amateur radio and WERS more harm than good. WERS is not fun. It is a grind, a job, a service we do without pecuniary gain, often without thanks; but we are not doing it for either pay or thanks, we are doing it as a service to our country. If that is not enough reason for *you* to take part, then we advise that you drop it.

Fortunately, the percentage of amateurs harboring such an attitude is comparatively small. Incorrect operating techniques among us amateurs are the result of habits, not easily overcome, which have been formed through years of amateur operation. It is now up to us to make a determined effort to break these habits, and at the same time to refrain from setting ourselves up as examples for operator trainees. Such trainees can learn much from us, certainly, if they are interested in technical and practical radio; but they have little to learn from us in the way of operating techniques. Rather we must learn these techniques with them, and contrary to being further advanced in this study than they, as many of us suppose we are, we are handicapped by retention of our former carefree ways before the microphone. So come down off your high horses, gang, and let's get down to business.

As more and more CD-WERS licensees get past the testing stage and enter the drilling stage, the question of a definite operating procedure becomes increasingly acute. We have been asked by many of our members participating in CD-WERS to devise a standard operating procedure as an example to be followed; but alas, we cannot do so. We have concluded that any procedure that we might devise would be found to be suitable in but comparatively few cases. Circumstances vary so widely among the 170-odd licensees that operating procedure necessarily must be adapted to the particular situation in which an organization finds itself.

What we can do, however, is to discuss general principles to be considered in devising the operating procedure that best fits your community, and we herewith do so:

1) *Identification.* In this respect alone, FCC sets down a rule. Complete identification must be given at the beginning and ending of each complete exchange of communications; that is, not only the station transmitting, but the station to whom the transmission is directed. If spot frequency networks are utilized, the net control station can call the roll at the beginning of the net, exchanging complete identification with each member station, after which subsequent transmissions need no further identification, except possibly by unit numbers so stations in the net know to whom they are talking. Examples:

WXXX1: WXXX1 calling WXXX2, answer roll call, go ahead.
WXXX2: WXXX1 from WXXX2, answering roll call, go ahead.
WXXX1: OK 2. WXXX1 calling WXXX3, answer roll call, go ahead.
WXXX3: WXXX1 from WXXX3, answering roll call, go ahead.
(Etc., until roll call completed)

WXXX1: 2 from control, ready for your traffic, go ahead.
WXXX2: Control from 2, here traffic. . .

With enemy planes approaching, however, announcement of call letters might reveal the locations of your units. It is recommended, therefore, that, at any time after the blue alert and until the all-clear, call letters be omitted, as well as any other information that might possibly be of value to the enemy. This is *required* by the Army in some sections, and we strongly recommend its general observance.

2) Most local ARP organizations utilize standard report forms for use of their air raid wardens in reporting incidents. It would expedite the handling of incident reports, therefore, if WERS systems used the same forms. The standard form devised by OCD which is used in most ARP organizations contains numbered items from 1 to 11. Each such report can be numbered, station unit number and time of origin noted and transmitted as part of a preamble, and the message sent by the numbered items without mentioning what each item stands for, and omitting items not applying, such as: "Message number 1, 32,

815PM, Item 1, Smith, 147; Item 2, Main and High Streets; Item 3, incendiary; Item 5, yes; Item 9, 810PM; Item 11, fire apparatus needed; end of message." The sending operator then marks down the time message was sent and to whom, while the receiving operator marks down the time it was received and from whom. The completed form is then ready to turn in to the report center, a very few seconds after it is received. If the operator's writing is legible there is no necessity for copying.

3) Warden reports can be made even shorter than the above example by omitting the item number altogether, and by omitting mention of any items which do not apply. The idea is that the message should be as short as possible while still capable of being understood and copied on a regular report form by the receiving operator. Such reports might also carry priority designations in the preamble to indicate their urgency, such as "rush," or "regular," or "duplicate." A duplicate message might automatically become of rush priority if one of the net stations says "Duplicate my number 4," which would mean that no action so far had followed transmission of the message and the situation was becoming urgent. The receiving operator, in this case, would jot on a slip of paper something like "Duplicate #4, 32 (station unit number)" and turn it in to the report center.

4) The briefing of warden reports can be carried even further, if desired, in connection with the thought that the enemy, by listening on the proper frequency, can determine by the incident reports just how much damage he has done. This makes some system of coding desirable for transmission of warden reports — a simple code system which is easily decipherable to participants but not apparent to enemy listeners. Only information that might be useful to the enemy need be coded, such as location of damage, number and type of casualties, extent of damage to property, roads blocked, etc. The only effective way of putting such a code into practice is to agree on certain letters or numbers to represent certain words or phrases, and to practise and practise some more in handling traffic using such a code. Many communities are divided into zones to facilitate the locating of incidents, such a location perhaps being given as "Zone 3, Main St. near Cedar." This could be coded as "Zone 3, Mary near Charles." If there are two streets in the same zone beginning with the same letter, it will be necessary to be able to indicate which one is meant. This could be done by saying "Mary 1" for Main St., and "Mary 2" for Market St., the former preceding the latter in the alphabet. Such a system would tell the receiving operator that there is more than one street in the zone beginning with that letter and enable him quickly to locate it on the map by alphabetical sequence.

5) It is likely, of course, that warden reports will not be the only type of traffic handled over WERS stations. Other traffic can be sent in more or less regular fashion with a preamble consisting of a number, station of origin and time, but addressed to a specific person or official, such as: "Message number 4, 17, 920PM To Chief Air

The Cleveland CD-WERS organization was one of the first in the country to have an opportunity to render actual emergency service to its community (see Brief on page 64). Here are photos of the Cleveland report center and a unique mobile unit.

Above—K. L. Bowen, W8QLN, shown at the WERS report center station, WJJH-18.

Left—Bert J. Lisy, W8WLP, is here seen operating portable unit 96 of WERS station WJJH, in East Cleveland, Ohio. *Right*—Close-up of the installation. W8WLP's bicycle carries three 45-volt blocks of "B" batteries, eight 1½-volt dry cells (wired in series-parallel to furnish 6 volts for the transceiver), an Abbott DK-3 transceiver and a 15-inch bus-bar antenna.

Raid Warden, Report Center (or merely to *Smith*, assuming that receiving operator will know who he is). Request auxiliary police assist in traffic control corner Washington and Main. Brown."

These are just a few broad hints, not specific suggestions. The actual procedure developed will have to be one conforming to your particular situation, which in itself is bound to be peculiar in some respects. In general, it might be said that the following principles should be observed in developing your operating procedure:

1) Comply with FCC and Army regulations.

2) Make transmissions short and to the point. Eliminate all unnecessary words.

3) Adopt a procedure that will conform as closely as possible to that used by other parts of the ARP communications service.

4) Evolve your procedure around the slogan "The enemy might be listening" and arrange it so that the presumably listening enemy will in no way be aided by your transmissions.

5) Avoid unnecessary complications. The ideal operating procedure is one which will accomplish the objectives in view as simply, quickly and efficiently as possible.

CD-WERS Progress. On May 1st there were 169 CD-WERS and 7 SG-WERS licensees. October, 1942, during which 29 licenses were issued, seems to have been the high point of CD-WERS licensing to date. 26 were issued in November and January, 24 in December and March. There were declines in February and April, during which 14 and 16 were issued, respectively. There are now licensees in 34 states and the District of Columbia, the greatest number in Massachusetts (21), with New Jersey a close second with 20. This indicates an increase of 116 licensees and an addition of 14 states over data reported in January *QST* — almost 600 per cent increase in the number of licensees! Operator permits issued have reached a total of 3585 over the previously reported 529. These data simply show that, despite obstacles which have tended to retard its growth, CD-WERS is still on the upswing and not yet through growing.

—*G. H.*

This photo shows the radio class of the Santa Cruz (Calif.) High School in action. The class is taught by F. A. Kazmarek, W6EMZ, and is a continuation of the original radio class which was started fifteen years ago. Graduates have gone into radio work all over the world.

Honor Roll

The American Radio Relay League War Training Program

Listing in this column depends on an initial report of the scope of training plans plus submission of reports each mid-month stating progress of the group and the continuance of code and/or theory classes. All Radio Clubs engaged in a program of war radio training are eligible for the Honor Roll. Those groups listed with an asterisk teach both code and theory. Others conduct only code classes.

*Adirondack Amateur Radio Assn., Gloversville, N. Y.
*Amateur Radio Club of the U. S. Naval Academy, Annapolis, Md.
*Burlington (Vt.) Amateur Radio Club
*Detroit (Mich.) Amateur Radio Assn.
*East Texas State Teachers' College Amateur Radio Club, Commerce, Texas
*Edison Radio Amateurs' Assn., Detroit, Mich.
*Jersey Shore Amateur Radio Assn., Long Branch, N. J.
Knoxville (Tenn.) Radio Communications Club
Tucson (Ariz.) Short Wave Assn.
Vermont Academy Radio Code Club, Saxtons River, Vt.

BRIEFS

When the local civilian defense organization was called out to participate in rescue work following the recent tornado which inflicted severe damage on several Ohio towns, Cleveland CD-WERS was on the air to aid in dispatching additional crews of wardens and policemen to various points where they were needed. WJJH-9 and WJJH-10 rendered especially valuable service by giving a running account of the traffic jam of sightseers after the tornado, thus aiding in the proper placement of traffic control officers. Although damage was extensive, normal communication did not fail. The radio aide for Cuyahoga County CD-WERS is John A. Kiener, W8AVH, and among his assistants and operators are W8AOK, W8PAL, W8LB, W8WLW, W8PBZ, W8LVS and W8DS. The greater part of the operation was done by mobile units, which were moved about to locations where they were most needed.

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•The first court case involving violation of FCC Order 99, regarding registration of radio transmitting apparatus with the Commission, was called in February. Carl Thomas Crouch was arraigned in the United States District Court for the Southern District of Ohio for failure to register his equipment. Crouch pleaded guilty and was fined $400. The fine was suspended.

—•••—

We recently learned that Charles W. Ammen, W5FXK, found himself in quite a spot shortly after December 7, 1941. He was pounding brass on a Jap fishing "tub" approximately 400 miles off the coast of Costa Rica at the time. When the U. S. Navy arrived on the scene W5FXK landed in two jails in two countries in five days, but he finally was cleared and is now working as a Civil Service radio inspector with the U. S. Army Air Forces.

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As this issue of *QST* goes to press, news reaching us indicates that WERS is playing an important part in disaster communication in the flood-stricken midwestern areas. Granite City and St. Louis are two licensees we have already heard from, and more information is coming. Full details will appear in the next issue. All radio aides and emergency coördinators who took part are requested to report complete information to Headquarters.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — WERS operation has settled down to routine in the Phila. area with all licensed community setups tested and found to be in good condition. Lower Merion is considering the use of 224 and 400 Mc. to get more channels. The frequency measuring problem gave all a few worries but it is apparently under control now. DYX writes that he is with the Federal Telephone and Radio Co. of Newark. His ten-month-old baby girl can say dit dit dit dah, so we suppose she is on the right track on two counts. JBC is getting quite a workout at Fort Jackson, S. C. JVF is trying to get WERS started in Lansdowne. IXN went down for his class A ticket. GGC has portable mobile WERS rig in his farm truck. He actually made a WERS test while enroute to market with a load of produce. GHD suffered a lapse of memory (got married recently) and let his ticket expire. IXC has a TR4 in his car. CAA just got out of the hospital. HTI is doing some electronic research work at Villanova College. EOZ is now with the RCA Mfg. Co. CHH got a six-month deferment, as did DMQ, because of the critical electronic work they are doing. Lots of the fellows in the Service follow this column for news of their friends at home. In order to keep them informed, please send in your activity reports. That's all for now. 73, Jerry, W3BES.

SOUTHERN NEW JERSEY — Acting SCM, Ray Tomlinson, W3GCU — Asst. SCM, ZI; regional EC in charge of emergency coördination, BAQ; Emergency Coördinators: Somerville and vicinity including Southbranch, ABS; Asst. EC for Hamilton Twp., ASQ. Hamilton Twp. license for WERS has been granted by FCC under the call WKPX. Plans have been formulated for immediate installation of two fixed stations and the assignment of districts, to be covered by each individual during tests or actual emergencies, has been made. Present plans cover installations in nine volunteer fire houses, Police Hq., and the Municipal Building. Examinations for WERS operator permits will be conducted by ASQ immediately upon receipt of necessary material from FCC. Equipment for stations is being constructed from old b.c. sets. Code and theory classes are being conducted by ASQ in the nine fire houses, amounting in some places to two in one evening. ABS reports that their operating program for Hillsborough and Branchburg Twp. WERS, which will include Somerville, has been approved and returned by OCD in Trenton. WK and IDZ of Somerville have joined the program and are working along with ABS and ACC. Application will request license for independent operation of Hillsborough and Branchburg Twps., with Somerville operating under same. Come on, gang! Let's hear what your towns are doing! WERS work is not rationed! HEV, former U.S. NCR, is now in active service in the Navy, address unknown. Address CCO, Lt. Lester H. Allen, Aircraft Radio Labs., C and N Division, Wright Field, Dayton, Ohio. FMU, now lt., recently completed advanced flight training and received his wings. Ray is at Luke Field, U. S. Army Air Corps, Phoenix, Ariz. HW is now with the Aluminum Corp. of America, as an electrical construction engineer. Eddie Peters (LSPH) has been transferred from Newport Training School to a post somewhere on the West Coast. Reliable sources report BAY a lt. cmdr. in the Navy. JOL and HTJ report hearing several North Jersey WERS units during blackout tests recently. GCU, JOL, LT and others are working on WERS equipment construction for Hamilton Twp. WERS. ABS and ACC are working on WERS construction also for Hillsborough-Branchburg Twps. program. ABS, ACC and several non-hams are progressing with wired wireless communication. ASQ and others are also working out with land wire work. GCU wants a copy of Sept. '42 *QST*. Anybuddy got one they don't want? And so, till next time, best luck and wishes to members in Services, and 73.

WESTERN NEW YORK — SCM, William Bellor, W8MC — The Gloversville gang are still running code and theory classes and have put a lot of men in Signal Corps and Navy radio. They are making good progress with WERS also, with BDK as EC. Six fixed and three mobile stations are awaiting a license. Syracuse area WERS has been operating since last January under the call WKBS, with STD as radio aide and EC. They have a modification of their license pending which will bring their strength up to 21 units. 80 operators have been trained and more units are being built to eventually thoroughly cover the whole warning area. QLI is trying to start some WERS activity for the Corning area, and is anxious to hear from others who can help. OGC has built a new WERS rig using an RK34 and long lines. LTJ is teaching radio and navigation.

WESTERN PENNSYLVANIA — SCM, E. A. Krall, W8CKO — Gas rationing, combined with the suspension of radio club meetings, makes news very hard to get. TTD is still located at Neosho, Mo. TVA is stationed somewhere in Brazil. OMG is attending Air Corps school in South Dakota. TTN is at an Army School in Chicago. GJX, JW of WLQ/3SN, is now a staff sgt. and operates WVCU at Camp Ritchie. He will be a W8 located at Ambridge after the war, and we congratulate him on his marriage to a W8 YL. RTU, USN, recently underwent an appendicitis operation. We offer sympathy to VYU upon the untimely death of her mother. We also tender congrats to her for winning a scholarship. AIG just does not get the breaks. He had visions of several fishing trips instead of pounding the forbidden brass — then along came gas shortages. RXT is a corp. in the Army Air Forces at Langley Field, Va. How about those monthly reports, fellows?

CENTRAL DIVISION

INDIANA — SCM, LeRoy T. Waggoner, W9YMV — The WERS license granted to Sullivan brings the total of Indiana communities served by WERS to seven. Sullivan was assigned the call letters WKPB. The setup, with CZD as radio aide, includes four units at present. There are at least three persons trained for radiotelephone restricted permits, and there is a comprehensive WERS plan covering the entire county. SWH reports Fort Wayne central control station was copied 100% in Garrett, using conventional equipment. While not particularly noteworthy as DX, it does indicate that interurban WERS traffic in Indiana is more than a hopeful dream. Kokomo is preparing its CD-WERS application for license, covering Howard County. Details of proposed operation indicate a well laid plan; OKU is radio aide. There is no EC for Kokomo. Volunteers? AB reports that Mishawaka hams prefer xtal control for CD-WERS. Some sort of mopa rig for field units is being planned for. Richmond participated in the mock air raid by CAP planes. A number of "incidents" were reported to control center via CD-WERS. WXG is RT1c, teaching radio at Treasure Island. WQA entertains Av/c's by reading *QST* mention. YDA, Class A since April 23rd, teaches code for Signal Corps at Indianapolis. We'd like the mailing address of RSP, who is seeing the globe with the merchant marine. KBQ is a t/sgt. at Camp Howze, Texas. Mr. Zellon Audritsh, ass't communications coördinator for Indiana, is papa of a jr. op. There is a lot of WERS activity in Indiana CD, CAP and SG, and there is a lot of news about wired wireless, supersonics, etc., but I cannot report it in *QST* if you don't report it to me. Will you help? Thanks! CUL, Roy.

MICHIGAN — SCM, Harold C. Bird, W8DPE — RSK turned in his receiver and several meters to the cause, and is also toying with idea of making a handy-talkie for use with WERS in his area. Report received from EMP says he is asst. post communications officer at an airfield in this country. He enjoys handling the two-way radio in the tower. He is getting a little ham work along with Army work. Says he enjoys this column and wants to pass along his regards to the old gang. Anyone wishing to contact him, can address him as: Lt. Ralph P. Horian, AAFFGS, BAAF, Fort Meyers, Fla. DARA reports their classes are showing great results. Several of the students took the ham examination. Would like a report from Lansing on the results of the recent trial blackout, and the functioning of WERS. The Oakland County Radio Club has decided to build up WERS in Pontiac. They have applied for their license and hope to have things going in the near future. Although Grand Rapids, Detroit and Lansing have been licensed for some time, the reports are slow forthcoming as to their activities. Please, fellows, send in your reports on your activities! The boys in the Services read this column for news of what we back home are doing. They turn to it almost the first thing, I am told in various letters received. Let's give them something to read, even if our space is limited. A little item of the

old home town might be very cheering news. Come on, gang, let's have the entire space full next issue! Thank you and 73. — Hal.

OHIO — SCM, D. C. McCoy, W8CBI — CANTON: NXJ has been appointed EC for Canton WERS region to replace MWL, who resigned recently. ADQ is WERS radio aide and is busy getting papers together for WERS license. CINCINNATI: WERS operations going full blast. Four mobile units have been engaged in county coverage work. Coverage is reported quite good for the frequencies available. More operators are needed to fill in the ranks. If you have a valid FCC operator's license, get in touch with UPB — phone VA-0701, or VND — phone VA-7500, for details on signing up. Those not holding licenses can get training at several places in the city. Phone Ray Murphy, QUK — SY-7897-J, for information. WERS operator's permits have been received for a number of applicants. Get in touch with VND or UPB for them. MIDDLETOWN: WERS license has been applied for, but has been held up by FCC on technicalities. 25 are being trained for 3rd class phone permits. YOUNGSTOWN: WERS license has been issued for Youngstown, covering 35 units for operation in Mahoning and Trumbull counties. Call is WKML. 40 students for 3rd class phone permits will be examined shortly. All hands are busy getting equipment installed for operation now that license has been issued. CHILLICOTHE; PRW is home on furlough from Cuba. CUO is teaching school at Rantoul AAFTS. OUX is an inspector for Signal Corps at Kansas City; SO is same at Sandusky, Ohio; OVP is telegraphing for the B and O RR at Columbus; PRW is RM2c in Navy somewhere in the Caribbean; TRX is RT1c in Navy and is now at San Diego laboratories; LSJ is piloting bombers at Victorville, California School; LSK is attending AAF radio school at Chicago and PUN is teaching radio fundamentals at ESMWT school at home. COLUMBUS: QMN has resigned as radio aide and EC for Columbus to enter the Navy as lt. (jg) May 1st. QQ has been appointed EC to succeed QMN. Bob Schwepston has been appointed radio aide to succeed QMN, and QQ will continue as personnel officer of WERS. A meeting was held April 23rd to arouse more interest in WERS among the local amateurs. Columbus amateurs are urged to join the WERS. Landis Nunemaker, president of the CARA, and Ed Enderle, secy. of CARA, pledged 100% coöperation with WERS for the CARA. Landis is busy with the Signal Corps as his contribution to the war effort, and Ed is now active in CAP work. QQ has his hands full installing emergency power for the local broadcasting station, WBNS. DAYTON: Local WERS going full swing. Application for renewal and modification of license has gone in to FCC. DMN, LCO and RHH have been busy giving 3rd class phone exams to about 80 students. Students have been assigned in small groups to units on drill days to give them some idea of how the WERS system operates, pending the time when they are licensed and can actually operate. MFV writes from 3rd communications squadron at Alamagordo, New Mexico: "Lots of sand, hot in day and chilly at night, and enjoying handling a trick at the local air corps station . . . expect assignment to overseas service soon." EATON: SID writes that he has received dozens of letters about his gas-engine generator in February, 1943, *QST*. The correspondence is too heavy for him and he suggests that the gang look over November, 1937, *QST*, which gives full details. PRS is getting set to operate fixed in Eaton when modifications of Dayton license are granted. VYE has an Abbott TR4 installed in his car for portable mobile operation in the Dayton setup and another ready at home in Camden for fixed operation, when modification of Dayton license is ready. FLETCHER: WDG reports license has been granted with call letters WKOR, and is ready for operation. They tried operation under Piqua, but peculiarities of the 112 Mc. band and the terrain between the two towns made communication too uncertain. GREENVILLE: UMA reports FCC has held up their license on technicalities. Is trying to get these straightened out. ARW reports in phone conversation that he is working long hours, usually 7 days a week, at Farnsworth Radio and Television in Ft. Wayne. GENERAL: In general, WERS continues to progress throughout Ohio where the gang has stepped up to the problem and tried. There are still a number of important areas where no activity has been noted. Local hams should step up to this, and if necessary, prod their local CD council into action. The State council is ready to coöperate if you need help to awaken the local council. Write the SCM if you need help. I hope more ECs will report. How about it, gang? We are all busy, but we owe a few hours each month to our hobby, so let's have a good showing of reports for May! 73, Dan.

DAKOTA DIVISION

NORTH DAKOTA — SCM, John W. McBride, W9YVF — UGM reports from Lawson Field that his brother is in Texas. QGM is now in Los Angeles and reports that they like the West Coast. IHS has moved from Wahpeton to St. Paul, where he has accepted a job with United Air Lines. UNV moved to Wahpeton, and a fire destroyed his garage and most of his and UNU's stored radio equipment. ZVE is radio instructor at Aberdeen, S. Dak. The last report we had on PQW and CHB was that they were headed north thru the Canadian woods. YOY is now in North Sacramento, Calif. RPJ, Gay Uto from St. Paul and Art Peterson from Devil's Lake are also at Sacramento. MCV is now instructor at American Institute of Television in Chicago. He acquired a wife last September. OXM is now a staff sgt. at Camp Hood, Texas. Carl Cabasin, another ham from Fargo, and former engineer at WDAY, is an engineer at the NBC studios in Chicago. YTX writes from Hawaiian Islands; UGC is operator at Omaha, Nebr. Your SCM is just getting over a second round with pneumonia. Please keep your reports coming in as that is the only way I have of getting dope for the monthly *QST* reports. John, W9YVF.

SOUTH DAKOTA — SCM, P. H. Schultz, W9QVY — During the past month I have received no reports from the South Dakota Section, therefore it is impossible for me to report. I would urge each member to drop me a post card and tell what he is doing and where he is now located by the 16th of the month. If the members expect the column to be continued, it is necessary that I receive some news each month; otherwise South Dakota will be listed among the missing.

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — Attention is called to the fact that this SCM is falling in line by cutting out all except items of activity in these monthly reports. This will assure the Dakota Division its regular allotted full page of material. No effort will be made to "pad" the monthly reports with filler material or comments, so unless you send in reports on the fellows or about your own whereabouts, our allotted space will not be used. 'Nuf sed! Send in your reports! BHY and MTH and their XYLs spent week-end with FUZ and family, and visited the communications section of Alexandria CAP squadron. CJB is taking EE at U. of M. NQD, radio op in Merchant Marine, has been in St. Paul on a short leave of absence. Forrest Schultz, RT3c, gives his address as NATTC, Bks. 6, Ward Is., Corpus Christi, Texas. ZWW, now sgt., is located at 21st Airways Comm. Squadron, 1600 Textile Tower Building, Seattle, Washington. MPI, recent papa of a jr. op, is training with the FBI at Phila. He may be addressed at QTH shown in last call book. 73 es luck, Army

DELTA DIVISION

ARKANSAS — SCM, Ed Beck, W5GED — As this report is being submitted, we, along with the balance of the Arkansas River valley, are undergoing a few days' temporary reprieve between two consecutive floods — each of record-breaking proportions. Hundreds of thousands of acres completely inundated, hundreds of families homeless, uncalculated property damage and the breaking of the recently completed cross-country oil line are but a few of the results to date. Very commendable work was accomplished by the U. S. district engineers, various Army groups, and the Red Cross and CAP made a few observation flights. GNV and XYL enjoyed Easter in New Orleans. ARH has taken on new duties as chief op. at KASP. IDQ is back in previous harness as chief at KRAE, HDR expects to be back home with a new bug soon, as a veteran of foreign service. DVA is with the armed forces in foreign service. IGN recently cast his lot in with the Signal Corps. BMI is putting in a regular trick at the mike. If any of the gang should be interested, the next regular examination will be held on Tuesday, July 13, at 9:00 A.M. in Little Rock, Ark. So long, 73, and all the best, gang. — Ed.

LOUISIANA — SCM, W. J. Wilkinson, Jr., W5DWW — Not much dope again this month. What's the matter, fellows? HSH has completed preliminary training and is now at sea as a RT2c. HSN and GOO are stationed at Drew Field, Tampa, Fla. GEK, an XYL, is operator at Barksdale. EBB is also at Barksdale. ERV is practicing c.w. and says he will be ready when we start up again. Shreveport WERS has had several fine drills and is progressing steadily under

guidance of ZS and CEW. Would appreciate dope on other WERS in this Section. Let's have more news from you at home and in the Services! 73 till next month, Dub.

MISSISSIPPI — SCM, P. W. Clement, W5HAV — The Gulf Coast Amateur Radio Club is still going strong. The Coast amateurs on the home front are determined to have a live club going when the boys in the Service come home. We expect to have a WERS network in operation on the Gulf Coast in the near future. Six u.h.f. transmitters are ready for operation as soon as authorization can be obtained. JHS has been conducting a code class at his home for several months, and reports much interest in this activity by his students. He is engaged in radio maintenance work at a Navy base. JSH is engaged in radio construction work for the Signal Corps. AFV and HRX are doing electrical and radio installation work at Pascagoula shipyard. ANP and DLA are doing radio service work, also government and police installations. JGP in the Maritime Service is home on leave after a close call in the North Atlantic. His ship was sunk by enemy action, and he was picked up unconscious in the water and hospitalized for several weeks in Scotland. IBO is a 1st lieut., stationed in Louisiana at present. HEH is RM2c in the Navy, now at sea. H. W. Kirkpatrick, op license only, is a u.h.f. enthusiast, and has built up a 2½ meter transmitter and receiver to be used in WERS. Hams at Keesler and Gulfport Fields are invited to attend club meetings, which are held the second Wednesday in each month. I would like to have reports of all ham activities in the State each month, and also information as to Mississippi hams in the Service. 73.

HUDSON DIVISION

NORTHERN NEW JERSEY — Acting SCM, John J. Vitale, W2IIN — CQD has been appointed regional EC in charge of emergency coördination. His address is Winfield G. Beck, 617 Spruce Street, Roselle, N. J. Phone ROselle 40969-M. LI of Union, N. J., local radio aide in WERS, has been appointed EC; EUI, radio aide of Roselle, and IIN of Elizabeth have been reappointed ECs for their localities. IIN has been appointed radio aide for Elizabeth, N. J., and expects to get organization going as soon as several points are cleared up with the local officials. Millburn, N. J., WERS call letters are WHLH. IIN has changed his war efforts to aircraft communications, and CUW of Rahway, N. J., is doing same. UCARA has temporarily suspended meetings till after the summer period, but is functioning on any matters of importance by the call of the chair or executive committee. Present officers of UCARA are AGH, president; IIN, vice-president; LKN, treasurer, and TH, secretary. Many towns in the Section are active in WERS. Why not get a report to your SCM or regional EC, CQD, on "who is who" in your local setup? If you need any help or information, do not be afraid to write! Let us know how far you have progressed in your locality, and who is the radio aide. He should apply for EC appointment to the SCM or EC. Let's get some of your club activities in these pages. Who are your present officers? Who is in the Service? What rank are they holding? The success of this column for NNJ depends on you.

MIDWEST DIVISION

KANSAS — SCM, Alvin B. Unruh, W9AWP — MFH, who is a Navy lt. stationed in the Pacific, recently visited the home gang in Wichita. LTJ of Eldorado is Army bound. He is the son of QQT, who is a radio technician for Boeing Aircraft. ICV will remain EC for Zone 3 — Shawnee, Wabaunsee, Pottawatomie and Jackson counties. PKF is very QRL with TWA airline business. IWS taught code class and has 2½ meter rig for WERS. LFB, EC and radio aide, Wichita, reports progress is being made, with hopes of material results in the offing. JGG, formerly of Coffeyville, is working for FCC in Great Falls, Mont. YLY is working for Signal Corps as inspector. PLK, who was previously reported as transferring to Paola for the highway patrol, will remain in Wichita as dispatcher and chief radio operator for Boeing plant protection. ESL, EC for Zone 1 — Doniphan and Atchison Counties, is instructing at KU, Lawrence, but will continue as EC for Zone 1, with IWS as assistant. AWP received commercial phone 1st and telegraph 2nd tickets, and took job as radio technician with Boeing. BSP, who won the Paley award in 1941, has been commissioned a lt. by the Navy, and was to report at Noroton Heights, Conn. in May. ICV says fish are bitin' in Lake Shawnee. OSJ is chief specialist at Naval Air Tech. Center, Memphis. RXK is working in Miami, Fla., and NNU is in Army at Tampa. MAE's son is in Sig. Corps. ZAT is in Sig. Corps at Tuskegee, Ala. How about sending in a little news, gang? 73.

MISSOURI — Acting SCM, Letha Allendorf, W9OUD — The quality is fine this month even if the quantity is limited, like everything else. A V-mail letter from PUV, Cpl. Jim, comes from somewhere in England after he was transferred from Los Angeles to Camp Blanding, Fla. There are two hams in his signal company, ZBD, St. Genevieve, Mo., and 8VAB, Steubensville, O. There are two copies of *QST* in the day room and PUV craves news of the ham gang. RPH and EOU are civilians with the Signal Corps in Baltimore. RPH sends regards to AGR and 5BPL who are across. SBX tells an interesting tale of his experiences as an op in the merchant marine. He took a new Liberty ship out in January and returned in April after doing the South Pacific and the West Coast of Chili. His last ship was torpedoed and sunk while returning from Egypt and he and the skipper made a 320 mile trip to land in eight days in a small boat, using the skipper's pants and Bill's shirt for a sail. He wants to contact DHN — any help available? HZI has been called by the Navy. ENF is back with the highway department after teaching radio at Camp Crowder with a temporary leave from the dept. CJR has terminated his connection with the highway patrol. WIS is still teaching Naval cadets at Wm. Jewell College. 4HLN (ex-9IGW) made it back to port from his second trip with the Merchant Marine. TGN wrote when he was last in port, saying nothing very definite about himself except that he will be very glad when the war is over. This makes two years in the Navy for Leo, without leave. BMS is running around in circles, teaching radio at the NYA and raising chickens in his off time. OUD is just running in circles with no excuse, but is very receptive to news. How about some? 73 to you all.

NEBRASKA — SCM, Roy E. Olmsted, W9POB — My report is late due to change of shift and starting new code class. A letter from YXR states that WERS license is in force at Potter with KQX at bat, YXR on deck and WUV in the hole. Let's get those appointments endorsed, eh? VRT is operating for CAA but no QRA. RGK is servicing cars and tractors at Gering. UHT still panics the profs with his new dental technique at Iowa City, and the underground has it that he is experimenting with romance. FWW rates RM2c in Hawaii. Report from GFI sez that BZR and QWW have finished radio training and both have been promoted to radar; QWU is with Army intelligence and soon reports for active duty; JBK recently mowed 'em down in his exams at Atlantic City with the highest grades ever awarded and ITM is serving in Air Corps on West Coast. LTL writes from the heart of Texas that he is still attached to AAF and is polishing a basket of eggs for the Oriental trade. He adds that NYU is with AAF on the East Coast and that PHW is taking advanced radio training in Wisconsin. Merle Nelson, ZFC, has been transferred from Nevada to a West Coast air base and sez "wx fb, want to buy Echophone EC-1 for barracks use of several amateurs." ROE says that he works at the Martin bomber plant on radio gear; that Ashland has made application for WERS license with four stations ready for action; that QMA is teaching code to recruits at Omaha; that KYD is still fixing radios but says the going is rugged; that DTT is attending radio school at Milford; that EDN is taking advanced radio schooling in Georgia and that GNH is with the submarine fleet where there is no closed hunting season. Regards to all, Pop.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — LFK, USAAC, now stationed at Army air base, Richmond, Va., writes he will soon have an XYL. DDP, s. sgt., Fort Benning, is now father of jr. op. JHN, USCG, was recently home on furlough. HSX now driving bus for Conn. Co. and honks out a neat CQ. MVE passed rdo. tel. 1st exam, was paid a visit by his jr. op who is studying radar in USN and was transferred to Phila., all in one week. MVH has jr. op in Army studying rdo. MJC left Ariz. for Ark., with her mother. 9ZZU, USN, New London, writes about a nice visit with DET. Correction to June *QST:* KYQ of WMTC is t/sgt. in SG-WERS instead of KQY. APA advises SG-WERS Bridgeport is now in opn. with 6 units. KAB new member, with CLH and DOV taking examination. EAO, state r.a., is calling a meeting of d.r.a.'s. Asst. SCM CTI writes KSD, KTF, LUZ, MIQ, NE, NGD, CTI, AXB and four other CD-WERS oprs. played active part in

recent surprise test held in Norwalk. A portable-mobile unit of the New Haven warning district was recently despatched to a CAP location during a Sunday test period and conducted a successful demonstration. Modification has been received increasing the total units to 52.

MAINE — Acting SCM, G. C. Brown, W1AQL — Greetings, gang! The Maine Section is back in the picture again. This is not a one-man job so let's have some news and keep the ole Pine Tree State out front. The news this month is from around my own area because no other reports were received, but next month I hope to be able to report on other parts of the Section. FQ is now overseas as a major in the Signal Corps. QH is home on leave from the Canal Zone. AUC is a lt. in charge of radio for the CAP at Trenton, Me. Ex-BFZ is working for the Northeast Airlines, Presque Isle. DBC is instructing code to a class of about fifty at Brewer High School. BLF is a postman in Bangor. BYI is a chief electrician in the Navy. CPS is working for the FCC in Boston. DAS is an RM1c in the Navy. AWY is a radio sgt. at Fort Bragg. Ex-ALZ is radio maintenance man for Northeast Airlines. AKR is somewhere overseas. UP has a 2½ meter set nearly completed. CBV is doing radio work at Dow Field, Bangor.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, Jr., W1ALP — JLK is moving to West Hartford for a new job. MAN says his draft board will be calling him soon. NKW's commercial ticket is burning his fingers, and he may go out on a ship. LYF has been out as a commercial op for two years. HWE has been ill lately. FSK has moved his family to Presque Isle, Maine. NKA and ITH are working in Presque Isle. ALP met the following hams in Presque Isle: 9TGI, 8EVI, 8VQG, 2LGS, 9BIN and 8GR, who are with the Army transport command. CTR is the radio aide for Framingham. JAQ is RM2c in the Navy. HQU is RM1c in the Navy and going to radio school. KAG is RM1c in the Navy and stationed in Maine. JAC still working at Dennison's in Framingham. JUL working in Somerville. JOV is working at MIT. DDM is very active in CD work and WERS. JQH is in the medical section of the Army. LUK is working in Springfield, Mass. BZJ is a lt. in the CAP communications office. BZJ, LQI, LPM and HVP are working for Ted Valpey. BZJ and XYL expect a jr. op in May. WS is working at Raytheon and has two sons in the Service, one in the Army and one in the Navy. MAL is still chief electrician at Hood Rubber. EAU has been appointed deputy controller in charge of communications for area 5D. MPT was home again for a short stay. 9YID is a staff sgt. in the Army, located in Presque Isle. FL met 9ARE going through. FSK met 9ARG. What say, all you hams? How about a card or a letter from you, wherever you are? Remember, your friends are keenly interested and look to this column for news about you. They are located all over the world, so do your part, and write to anyone of the SCMs!

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — News drifting up this way has been scarcer than hens' teeth, but here goes on the activities reported. WERS license WJPG was issued to North Adams, covering region 1B. Classes for third class telephone licenses produced a total of about 40 WERS operators. More were trained, but the Army caught up with them about the time of licensing. JAH is radio aide. Classes were taught by MJD, FZI, JAD, NAQ and JAH. Courses leading to ham tickets are temporarily sidetracked in favor of training in actual operation of WERS equipment, and building of additional units. Pittsfield is licensed under the call WKHW, with LUD as radio aide. AZW is regional radio representative for the Mass. Committee on Public Safety. Seventeen units are covered by the license, and most of the operating personnel are hams. Classes leading to ham tickets have been conducted during the winter months. Other WERS licenses have been granted to Springfield and Northampton, but the grapevine has failed to produce any reports here as to personnel, etc. MYZ is a major at Pope Field, No. Carolina. BAP is now located at Dalton. BVR keeps busy as head of the Signal Corps school at Westfield State Teachers' College. BNL reports things going slowly, but still keeps busy like the rest of us. How about some reports, fellows? WERS activities or other news should reach here so this report can be sent in the 18th of the month. 73.

VERMONT — SCM, Clifton G. Parker, W1KJG — AVP was recent visitor in Burlington, renewing ham acquaintances. MET is now 1st lt. with Army transport command and was last heard from at Louisville, Ky. MZE has just received his commission as a capt. in the Air Corps and is now stationed in Florida. He was a radio instructor at the N. E. Airlines school in Burlington. LWN and family have just moved to 204 Howard St., Burlington. JVS has terminated his duties at Brown Vocational in New Jersey, and has moved to 139 No. Willard St., Burlington, where he is instructor at the flight radio operators' school. JVS has also obtained his 1st fone and 2nd tel. ticket. Ex-LVP is now in the Army but his whereabouts are unknown. Burlington Amateur Radio Club is instituting new series of code and theory classes for the summer at the junior high school in Burlington, and are sponsoring a code proficiency contest in June. NPM won his master's degree at UVM, and is now working for the agricultural department at UVM. 8CEX is engaged in FM-AM receiving apparatus lore and reports fine reception W55M via unusual skip recently. NLO also reports FM reception activities at his post in Colchester. MJU won a place on the dean's list at UVM and for short time will be working with Stromberg Carlson in Rochester, N. Y. MYS at Alburg is active in Naval volunteers and reports ground work being made to establish a WERS license area in the Islands. A letter received by your SCM from AHN indicates he is making a good recovery from his escapade with the enemy in North Africa. FSV reports briefly since his enlistment but is on the move and has not yet been assigned to a definite station.

NORTHWESTERN DIVISION

IDAHO — SCM, Don D. Oberbillig, W7AVP — During the past few months the Idaho State Guard Signal Corps units have provided much needed emergency communications for various government agencies. Amateur radio operators participating have been: AQK, master sgt.; KJ, sgt.; ABK; AVP, captain, state staff, Signal Corps and HPH. Communications have been furnished to Civil Air Patrol to assist them in their search patrols and during the recent Boise Valley flood, communications were provided through the cooperation of the division of grazing and the Idaho State Guard. This was especially valuable in the dispatching of trucks of earth to strategic areas. The SCM would appreciate a card from members still in the state with data on employment, activities and news of interest. Tnx.

MONTANA — SCM, R. Rex Roberts, W7CPY — BIZ at Helena reports JAC is interested in low-frequency r.f. power line transmission. BIZ has complete 300-watt portable a.c. supply and HIZ is working on the same type of supply. These for probable use when the Helena WERS is completed. IVY can just listen in; he is in an iron lung, fellows. Drop him a line! Emergency Coördinator Ray Fretz at Great Falls reports FYN was home from Alaska for a short visit. HEM is now at Treasure Island. BXL and FOH are busy in the WERS. CBY is now permanently located in Butte.

WASHINGTON — Acting SCM, O. U. Tatro, W7FWD — BFI, tech. and operator in charge of KQJD, a special emergency station for a power co., reports that he is radio aide for Spokane's WERS station. He has 24 operators and they are all hams. He has 16 transmitters and expects to make application for more in July. He has wisely distributed these transmitters over the area. He has to cover the entire county. All the equipment is owned by the amateurs and has been placed in possession of Spokane City and County. The control is operated on 114016 kc. Their maximum airline distance to date is twenty miles with 0.7-watt power. FQN of Ritzville graduated from the school at Treasure Island and is now ART2c, and states that EPS has graduated and is now RT2c; FBW is a pilot in the Army; CTS and EWS are in the Army Signal Corps, and BVK is also in the AAF as a pilot with the rank of major. AIU is in the state foreatry dept., DDY in state highway dept. EXG, fully recovered from a long illness, is located in Tacoma. FEC is lt. at Brooklyn Field, Ala. FYQ is at Kodiak, Alaska. Understand Walla Walla Radio Club meets often and are rigging up a lot of u.h.f. for LD. Please drop me a line fellows, so we can give you credit in QST. Also want to hear from Seattle, where there is a lot of u.h.f. gear stored in a vault and a budget of over $1000 for more. Why not get busy and give us the dope on what you are doing? Your SCM is recovering at the Marine Hospital in Seattle, and expects to be out by end of June. 73, Tate.

PACIFIC DIVISION

SANTA CLARA VALLEY — SCM, Earl F. Sanderson, W6IUZ — LLW, RM. FQY, 1st lieut. in Army, writes from India that it's a great life over there. OHC now head

of a Red Cross chapter at Fort Monmouth. Her brother, CRZ, is in the Marines on duty in the Pacific. MOV/OPG, just commissioned 1st lieut., stationed at Fort Monmouth. BPT back on his feet again after a two month illness. KG devoting time formerly spend hamming to raising rabbits and chickens. IXJ recovering from an operation. HC, ACV, JTE and CFK met with Alternate Director FBW before he started for Hartford, accompanied by XYL DHV. LXA doing war work for Food Machinery Corp. JBV is a Navy inspector. EEX trying to keep the refrigerators going for the duration. Let's hear from you fellows located in Monterey, Carmel, Watsonville, Palo Alto, San Mateo, Burlingame, and other points!

EAST BAY — SCM, Horace R. Greer, W6TI — EC, QDE. EC u.h.f., FKQ. Asst. EC u.h.f., OJU. OO u.h.f., ZM. Oakland WERS held a test for 3rd class operators for WERS, and everyone of the ten came through with flying colors. WERS has been tested every Sunday, according to EE, with excellent results. For those still interested in signing up, I suggest you contact EE, as more equipment and operators can be used to good advantage. With so many of the local gang in the armed services and in defense work, WERS is a good way for the gang to get together on Sundays. Would appreciate a telephone call or a note on any dope you may have so it can be passed along in *QST*. Another day closer to victory. TI.

SAN FRANCISCO — SCM, Kenneth E. Hughes, W6CIS — Ass't SCMs, RBQ and GPB. ECs, DOT, RBQ and GPB. Activity in this section, naturally, is confined to WERS organization. This work is going forward in fine shape. Anyone with equipment or time which can be spared for this work is urged to contact any of the above listed men. The space in these reports is not sufficient to explain WERS in detail, but we will be glad to give the full details to anyone interested if they will only contact us. Gene Pera, DOT, 27 Gaviota Way, San Francisco, is the radio aide for this city. 73 to all section members here and abroad. KH.

ROANOKE DIVISION

VIRGINIA — SCM, Walter G. Walker, W3AKN — JAA reports from Charlottesville that he is taking a highly accelerated course in connection with his Marine Corps status. JHC at Buckroe Beach wants to get together with anyone interested in wired wireless in that vicinity. JNH, who was formerly on 40 meter c.w., is now signalman 3rd class on sea duty, and is going up for examination for promotion shortly. 8PIH, now a 2nd lieut. in Air Corps, is stationed at Langley Field. JOC is operator at WRVA and JQT is operator at WRNL in Richmond. NE reports by airmail that he is still sailing the South Pacific seas. He describes the location from which he writes as the famous old port of "blank" at "X-Marks-the-Spot." The Navy censor passed these locations as being OK. The latest dope on wired wireless in these parts is that the peak has been passed. Thanks to those of you who sent in the above news, and until next month, 73. — Walt, W3AKN.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Stephen L. Fitzpatrick, W9CNL — BQO is building code oscillators for members of Denver area code class. ZNN was a visitor of the AAROD at Denver on April 30, 1943. CAA made his annual trip to ARRL Board meeting. CNL visited with TFP and BQO while in Denver May 7–9. UPT is now located at Bisbee, Arizona, with QTH as Box 698. 7BCW, 7FVH, 6QVO, 6QBT and 7GLJ are also working there in the radio signal section. 5JZQ, a YL, is in the supply department there at the advanced Army training school in Douglas, Arizona. FKQ reports that the City of Aurora, Colorado, now has a WERS set-up with two stations; one a fixed station and one mobile. A WERS license has been issued. EC and WERS reports are needed. Has yours been sent in lately? Your SCM also solicits activity reports of clubs and individuals. Whether you are at home or abroad, this column needs your support, so how about it? 73.

UTAH-WYOMING — SCM, John S. Duffy, W7DIE — Wyoming: Shy-Wy Radio Club, Cheyenne, still having regular meetings, well attended. New officers: EUZ, pres.; JDB, v.p. and activities mgr., and ICZ, secy. and treas. They have nine 2½ meter rigs ready to go when city license for WERS is obtained. Rock Springs Amateur Radio Club meeting occasionally. DIE and BFC trying to build carrier current equipment for CD emergency communications. No news from Utah, or other parts of Wyoming. Come on, fellows, let's hear from Salt Lake City, Ogden, Provo, Casper, Sheridan, etc.! Send news to me by sixteenth of month, at address shown on page 4, *QST*.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Lawrence J. Smyth, W4GBV — The most interesting correspondence in quite awhile comes from ECF, stationed somewhere in the Pacific. To quote a small portion of Bill's letter, "I have seven hams in my detachment who are all fine operators and good workers. I have a very fine assignment. Have met many hams that I knew away back when. If possible, put my address in the activity department so some of my ham friends can drop me a line. My 73 to all of them." Drop your SCM a card for Bill's address. I would like to keep posted on the whereabouts of all hams from Alabama and to know what branch of the service they are in. I get requests now and then for someone's address. DPX is a 1st lt. now and is stationed in Atlanta. GOX, a sgt., was home for a few days from his station in Arkansas. AUP made a trip to West Hartford, Conn., to attend the ARRL Directors' meeting. ICT is with the Signal Corps. Lt. Grant, formerly with the police radio WMPM, was a visitor to WMPM this week. Would like to hear again from GAG, who is a sgt. in the Signal Corps. Also would like to hear from hams about their WERS activity. 73, Larry.

EASTERN FLORIDA — Acting SCM, Frank C. Fassett, W4BYR — Word just received that Director Bill Shelton is back in Daytona Beach. EDD reported for Army duty May 7th, and will be missed as EC for DeLand. HGO was in NYC on biznez recently, with side trip to radio row. He is taking over EDD's old EC job, which covers Sanford, DeLand and the balance of Seminole City. Another month passed by with no word from Jax area. DES still at Boca Raton according to last word, but expecting move any time. IAQW is at Miami Naval base. FRE is taking Navy radio course. FWJ is in Marine Corps taking radio. Bing Crosby journeyed to Tampa RI for Class A and got it. EYI is now uncle. DBO spent short time in St. Pete before moving to Orlando. Looks like DVO now has the "front office" at Mexpet. Now that you are up there, how about a little extra gas, Si? DIN is boiling the stuff down in pyrex these days at Bruce's Juices. GMJ is lt., S. C., USA, at Blanding. Nice word from FQZ who was with WDAE and whose present location unknown. Sez EEP is instructing at Scott Field. AFZ now sgt. at Charleston, S. C. FGZ's brother operating with Merchant Marine. HAD finally has been heard from in Seattle. DDM is now lt. cmdr., USNR, at Miami. CLW resigned as chairman sub-division comms., State Defense Council of Florida, and is now member of advisory committee for the Council. Ken Shelton, WDAE, Tampa, is new chairman for Council. Recent act of Florida legislature changed name of Florida Defense Force to Florida State Guard. Miami is now licensed in CD-WERS as WKNW. Capt. J. W. Hazelton is officer in chg. of comms., and is continuing his State Guard organization activity thruout the State. If you can't get to RI for examination, contact Capt. J. William Hazelton, State Comms. Officer, Signal Corps, General Staff, Florida State Guard, The Arsenal, St. Augustine, Fla. The govt. decreed a 10% cut in paper, fellows, not 100%. In other words, we still have some space allotted to Eastern Fla. for a report, but that space will go begging if you fellows don't send me reports on the news and happenings in your area. It's up to you.

WESTERN FLORIDA — SCM, Oscar Cederstrom W4AXP — Lt. Pickett, an old-time ham, has been promoted to lt. cmdr. GBM has been promoted from ensign to lt. (jg). ABY reports that his "NAC," OI, is now a lt. cmdr. and is on duty in Africa. Lt. Veasey says the Memphis gang is scattered to the four winds. The gang had another blowout at the Trade School in Pensacola. WERS was discussed and some interesting experiences were told about test with equipment in other sections, with UC leading in the talk. Eight cars were used in the test and all work was done within a radius of 10 miles. Hills made very little difference, but beyond 10 miles the hills had a shadowing effect. Plans were discussed for more coöperation with local OCD. Postwar amateur radio was discussed pro and con with 5BKH from Abilene taking a leading part. The general opinion was that there would be less power, less frequencies and tighter restrictions with closer coöperation with the various branches of the Service. 9NLF presided over the meeting with AXP as toastmaster. Next meeting will be on second Monday in

June. The known calls present were 9FHD, K8F and NLF; 4VR, UC, AXP, DZX, PE and GBM; 3DDG, 5FRC and BKH. The Gulf Elec. Sup. sent over a nice set of books for the gang to look over. FIO, formerly of Birmingham, and his NYA boys, are revamping some donated broadcast and other gear into WERS equipment. Red Flowers, a sgt. at Ft. Knox, Ky., paid a visit to the home town. He is one of the old NCR gang. W. L. Love, another member of Uncle Sam's Army, and a ham, is going places and doing things at Ft. McClellan, Ala. DAO is working on some radio gear. GRI of Panama City spent most of the week visiting with ECT and FJR. HJA is back with A & R again after a short leave of absence. Your SCM spent his allotted 5 days vacation moving to his new home near Navy Yard. He is now at 408 S. Pine Street, Warrington, Fla. AXP's son is taking radio course at the Lively Vocational School at Tallahassee, where BCZ is in charge of the radio department. The NYA School at Pensacola offers opportunities for those locally who wish to learn radio. Those interested in WERS should contact the local OCD and the SCM. The many hams in and around Pensacola in the Service and civilian, are invited to come to monthly meetings. Thanks and 73 to all of you — AXP, "The Old Maestro."

GEORGIA — SCM, Ernest L. Morgan, W4FDJ — AAY is lt. comdr. in Navy; HWJ and CPO also in Navy; FDX recalled to active duty and AGI is capt. in USMC. Forress Towns, ex-ENS, passed away suddenly at McRae, Ga. Forress was responsible for many in southwest Georgia becoming interested in ham radio and obtaining their tickets. Aviation Cadet Luther A. Harrell, Jr., EVT, of Valdosta, Georgia, was killed in line of duty on April 9th. His activities were mainly on c.w., and he had been active in club activities at Brunswick and Valdosta, Georgia. These two young men will be missed by legions of ham friends. FDH (EVT's brother) will carry on in the Marines for Luther. AEI is with CAP. DYK has a new jr. op. GIA called on FDJ on way to foreign civilian radio assignment. HRR has new YL jr. op. AAO has returned from foreign duty and is attending OTC. Leland Smith sends greetings to all Georgia hams. 30, Pop.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, H. F. Wood, W6QVV — Yes sir, Los Angeles' KGLV is born! Quite a bunch of operator's permits have been applied for and now it's just up to you to help do the big job that is outlined for us in WERS work in this area. The equipment is being placed in the control centers — the mobile, portable-mobile and walkie talkies are being assigned — and we hope that by the time you read this we will be holding our tests. There is still a lot to be done and a lot of room for your help in lending both your time and equipment, so now that Walt Matney has succeeded in getting the city license through, wake up that ham spirit! If you can't be an operator, file a list of your equipment for possible use (it's all to be controlled by the city or licenses and not by the individual), and if you can be available for certain periods of the day or night, let us know! Understand from SJP that the boys out in Huntington Park area are forming their WERS group; he says there are a number of them ready to go, so far as equipment is concerned. SCQ reports that the San Gabriel, Alhambra and Temple City groups are all holding tests of their equipment. RNN says Inglewood holding their regular drills and going fine. PTR and others have the Venice area all ready to get on the air, xtal-controlled xmitters, etc. The Valley group are about ready. The Highland Park area is very ably manned and credit for this must be given to QLM. She has done a mighty swell job both in training ops and in gathering up equipment. Hats off to her! Now if there's any that feel slighted on their areas in this meager report, it's your own derned fault. Gimme news, puleeze! For this time 73 es C U L on WERS! — Ted.

ARIZONA — SCM, Douglas Aitken, W6RWW — Latest reports of the Tucson gang find them bragging about their big vegetables instead of those tough DX contacts! SOB, TXM, OZM and GS still busy at some of the airports. 7GYK is also there now. A couple of additions to the Service list: UPF and TPJ. The whole gang sends congrats to QWG, who took an XYL unto himself in Phoenix on May 15th. A note from NUX, who is now building radio equipment at General Electric, states that he has joined the ranks of married hams! SGG and QNC dropped in during the month and we had a "blues" session, talking over days gone by. Wish that more of you would drop an occasional card and let us know something of your activities — we're interested in all of the old gang! You fellows in Service have free mail. Do take advantage of it! One of these days the shooting will be over with and we can return to peaceful hobbies and habits. 73. — Doug.

WEST GULF DIVISION

NEW MEXICO — SCM, J. G. Hancock, W5HJF — DER and 8WUY (ex-4IAK) paid the SCM a nice visit recently. DER, HJF, ISM and KCW are trying to work out plans and sell the local CDC on WERS. 3DPE (ex-HAG) is back in Albuquerque in secret radio research and sends report on Albuquerque gang. GGX is also back in Albuquerque where he just received his master's degree. Sheldon took the fatal leap while in Washington. FAG is civilian radio instructor at the Albuquerque air depot training station. GUZ was on Bataan. Attention, you fellows who are now stationed in the four corners and on the seven seas but who still call New Mexico home: Will you please drop me a card and give me the dope on yourself, especially whether you are members of ARRL? I am trying to find out just how strong we are, because as long as you are away your membership is credited to the Section. At the present time New Mexico is credited with only 48 members. I would sure appreciate your help in finding out just how we stand. We sure want a right to squawk when this is all over. Thanks for all the swell reports and please keep them coming. 73. — Jake.

The Month in Canada

ALBERTA — VE4

From W. W. Butchart, 4LQ:

SINCE sending in our last report 4BW advises that 4GM's stay on the Pacific Coast was shortlived and that he is now stationed in Ottawa. While Bill was out here he visited his home at Hanna and spent a day or two in Edmonton, at which time he and BW got together, and the stories came thick and fast. Mostly from GM, however, who has been places and done things since he left us. We can't tell you what Bill's work is, but you can take it from us that he will be able to tell us plenty after the war!

4HM has been constructing a copying stand for his Leica camera and appears to be doing a professional job. His daughter Betty, in Ottawa with the WRCNS (WRENS), has visited Ernie and Elva, 4WJ and 4AIQ respectively. She reports that they are well and enjoying life as usual. 4HT is turning out some very nice cabinetwork in his home workshop, using some of those cabinets made to house equipment units. They really look neat. 4AEN (Petty Officer George Marion, RCN) got himself engaged during the past month. He is stationed here in Edmonton for the time being, instructing at the Naval School for wireless over at the University of Alberta.

4EA has been hoisted (we were going to say "relegated" until we looked up the meaning!) from the sticks (namely CFRN's transmitter) to the up-town layout, much to his gratification. We hear Roy's voice on the air possibly as much as any other announcer at CFRN now. His versatile make-up qualifies him well for work on the control console, where he spends a good portion of each day. We are glad to inform our readers that 4BV is back at work after his recent illness, feeling fit again. 4EY still keeps up a very live interest in things radio and electric, but it's our guess that his new junior YL op takes up most of his spare time. Bill tells us that he and Mary of 4WH were working side by each for some time in the CNR office before they found out that each was a ham through some remark passed by 4AJM to EY!

4XE pulled stakes and left for Medicine Hat, where he is running a signaling school. His YF is getting nicely settled in Edmonton again after her recent move from Calgary. 4LQ is doing a spot of gardening in his spare time. This year he has the very "able" assistance of the junior op! While out at Edmonton's exhibition grounds the other day we

(Continued on page 72)

National Company, Inc.
announces with deep sorrow
the death of its General Manager
James J. Freeley
on Sunday, May the twenty third
nineteen hundred and forty-three

The Month in Canada

(*Continued from page 70*)

spotted a honey of a rotary beam on a house in close proximity to the grounds. It looked like a nice job. Wonder who it is that is so impatient to get on the air?

Coming of a somewhat belated spring starts us to wondering about holding a picnic or something. Possibly by the time this is in print we will have had one. There's just about time to prod 4VJ into action on the matter; then we can expect results to follow! So long for now, gang.

MAILBAG

ALTHOUGH written by a W, the following letter will be of interest to our VE members:

"In the past nine months I have traveled in 40 states and the whole of Canada. My work as an aero-engineer takes me to many of the big air-fields. Everywhere I go I run into amateurs, both in and out of uniform. They are all doing a grand job. The VEs aren't only grand fellows over the air, but just as grand personally. Although amateur radio has meant a lot to me in the past, it will mean more in the future.

"My last operating QRA was Dubuque, Iowa, and at present I work with the Air Forces in Colorado and Wyoming. While my work is not radio, there is radio theory involved. . . . I was eligible for the job because of my radio license and my flying license. I am also a pilot-officer with Civil Air Patrol.

"I'd like to hear from some of my old pals of 75–20–10 meters. If they are like me, they have been looking forward to the re-opening of the amateur bands since late afternoon of that historic December 7th. — *Sherman P. Booen, W9RHT.*"

From Stroyan Leith, Sr., father of 3ANE, we recently received a clipping from the Peterborough *Examiner* concerning his son's activities.

J. L. Gartshore, 20L, notified us recently that he had accepted a commission as pilot officer in the RCAF back in December. He has now completed the officer's training course and is stationed at No. 3 Wireless School in Winnipeg.

C. A. Norman, 20M, is working in the main cash office at T. Eaton Co. in Montreal, He keeps his station log going by making several entries a year in diary fashion.

And finally, a note from George Craft, 1JC, ex-5HY, now in Castlegar, B. C.:

"In reading 'The Month in Canada' in the January issue of *QST*, I notice that VE1FQ has my present whereabouts somewhat misplaced. Instead of being in Nova Scotia, I am in British Columbia. . . .

"To make a long story short, the XYL and I left Caribou Gold Mines, N. S., in September, 1941, and drove across Canada to Castlegar, B. C., having a swell trip. The reason for leaving was to visit home before enlisting in the RCAF. After spending much sweat in passing the technical exams for radio mechanic, however, the medical examiners ganged up on me and turned me down. So here I am back again, working as an electrician for the Consolidated Mining & Smelting Co., of Canada, Ltd.

"I have spent some enjoyable moments meeting some of the old VE5 gang and some of the newer ones. I would like to know where VE5BY is, and how he is getting along."

Let's Use Our Modulators

(*Continued from page 36*)

quality is greatly improved. You have all noticed this, I am sure. If a T-pad is put across the output, the output level of the tubes must be raised to give the speaker sufficient power to drive it. The amplifier then sounds well even at low levels of speaker volume. So the 10-db. pad, which consists of R_{16}, R_{17} and R_{18}, is used. Values given are for a 2.5-ohm speaker voice coil.

The power supply can be about anything that will give the voltage and current required.

With the foregoing suggestions you will be able, I am sure, to revamp your modulator into a good reproducer for records or radio programs until the time comes to make better use of it.

Serving on all our fighting fronts . . . the SUPER-PRO "SERIES • 200"

THIRTY-THREE YEARS of engineering research are built into every piece of Hammarlund fighting equipment. We're proud that our equipment **came through** with our fighting men in the successful battles of Africa.

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460 West 34th Street, New York, N. Y.

THE SIGN OF QUALITY IN RADIO

HAMMARLUND

MALLORY TECHNICAL DATA

Does Ohm's Law Work on Battery Chargers?

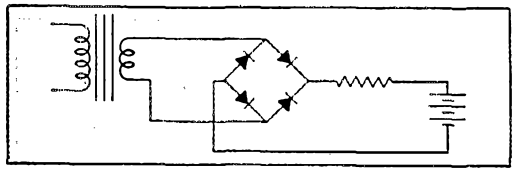

FIGURE 1

On several occasions we have had inquiries on the apparently inconsistent results obtained by the introduction of a resistance between the dry disc rectifier and a storage battery, as illustrated diagrammatically in Figure 1. The inconsistency refers to the altered charging rate being lower in value than would be indicated by a calculation according to observed direct current readings and the application of Ohm's Law.

Ohm's Law has held up pretty well for quite a while, and actually there is nothing in this instance which disputes it. The explanation lies in the fact that actual charging occurs on the peak of the rectified alternating current wave so that the peak current flowing in the DC circuit greatly exceeds the value registered by a meter.

Figure 2 shows in graph form the relation of the average current value, as would be read on a meter, to the peak value, for two complete cycles of supply. This graph is plotted from readings made by our rectifier engineering department in a representative application.

As noted on the graph, the average value is 22 amperes, while the peak value which furnishes the real charging action is 60 amperes, or roughly three times as large. Hence the effect of the introduction of resistance into the circuit would be much greater at the peak value (60 amperes) than at the meter value of 22 amperes which would normally serve as the basis for computation.

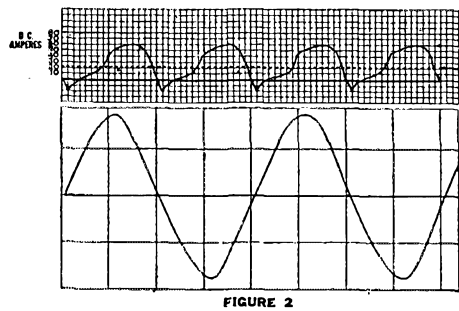

FIGURE 2

Negative-Resistance Oscillator

(Continued from page 25)

voltage varies the plate resistance from a positive value when the suppressor is either zero or close to it through infinity and to the negative value already discussed. For oscillator operation in the audio frequencies, a resistance-capacity network can be used instead of a tuned circuit, as demonstrated in Fig. 4.

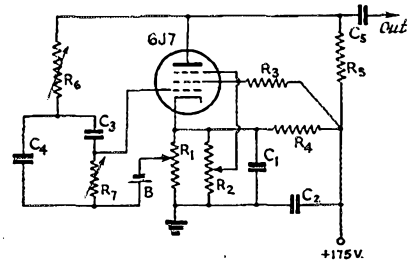

Fig. 4 — R-C oscillator circuit for audio frequencies. Frequency range with constants given is 320 to 6400 cycles, approximately.
C_1, C_2 — 0.1 μfd.
C_3, C_4 — 0.001 μfd.
C_5 — 0.01 μfd.
R_1, R_2 — Same as R_3 and R_4 in Fig. 3.
R_3 — 25,000 ohms.
R_4 — 50,000 ohms.
R_5 — 0.1 megohm.
R_6, R_7 — 0.5-megohm variable.
B — 1.5-volt dry cell.

Since equipment was lacking to make a more detailed study of the performance of this negative-resistance source, the author would greatly appreciate reports on the results obtained by others with this type of circuit.

Who Killed the Signal?

(Continued from page 55)

"They went off in that direction," Ohm informed him glumly, pointing.

The Sleuth walked around the corner of the chassis to find the two Meters sitting close together. They moved apart guiltily at his approach.

"We — we were just talking," Volt explained hastily. "We didn't think you needed us right now, so —"

"When you're on the job, stay on the job," the Sleuth reprimanded. "There'll be time enough for that after we've solved this case."

"Did you want us for something?" Milly asked anxiously.

"Yes. Volt, I want you to find out if B.F.O. Tube is oscillating. You know — the same as you did with Oscillator Tube awhile back. Come along."

OUT OF TODAY'S RESEARCH . . . TOMORROW IS ENGINEERED

AN IMPORTANT ANNOUNCEMENT

FROM THE NATION'S LEADING PRODUCER OF STEATITE CERAMIC INSULATORS

DUE TO TREMENDOUS EXPANSION IN CAPACITY AND PLENTIFUL RAW MATERIALS...THE STEATITE CERAMIC INDUSTRY CAN SUPPLY STEATITE INSULATION FOR ALL NEEDS.

THE TRADE CAN RELY ON STEATITE SUBSTITUTE MATERIALS ARE NOT NEEDED

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STEATITE CERAMIC INSULATION

AMERICAN LAVA CORPORATION

CHATTANOOGA • TENNESSEE

(Continued from page 74)

Volt followed the Sleuth and Milly trailed along. As they reached the apron Volt joined the procession. Single file they marched up the chassis.

B.F.O. Tube hadn't moved. Wordlessly, the Sleuth motioned to Volt to proceed with the test. Volt stepped forward and looked around, a puzzled look on his face. "How can I make a reading if I can't get at his circuit?" he asked. "His connections are all covered up under that platform."

The Sleuth glanced inquiringly at B.F.O. Tube but the latter stood stolidly uncoöperative. Milly, her normally placid face clouded with concern, suggested: "Why don't you take a look underneath the chassis? He must have some kind of path over which he sends his output."

"But his output is r.f. and I can't measure that," Volt objected. "I only work on d.c."

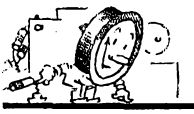
"Oh, yes, I'd forgotten," said Milly disconsolately.

The Sleuth intervened. "Look here, you," he addressed B.F.O. Tube sternly. "If you're really delivering the voltage as you say there's no reason why you shouldn't coöperate with us. If you don't I'll consider it a confession of guilt and take you in anyway. Now how about it?"

The recalcitrant Tube stared back impassively for a long moment. Finally he turned to B.F.O. Coil. "Take off your cover," he ordered brusquely.

The aluminum-sheathed Coil fumbled with the screws holding his shielding cover in place. Dropping the loosened nuts, he slid the shield off over his head.

"Now we're getting somewhere," Volt said, stepping forward. Touching his negative terminal to one end of the little Grid Leak cradled snugly in B.F.O. Coil's arms, he reached down to the chassis ground with the other.



VOLT TOUCHED HIS NEGATIVE TERMINAL TO THE LITTLE GRID LEAK AND REACHED DOWN TO THE CHASSIS GROUND.

The test took but a moment. "He's oscillating, all right," Volt confirmed.

Unbelief spread over the Sleuth's face. "Are you positive?" he demanded. "Make sure, now — don't let them put anything over on you."

"I'm not. They're putting out, all right," Volt insisted.

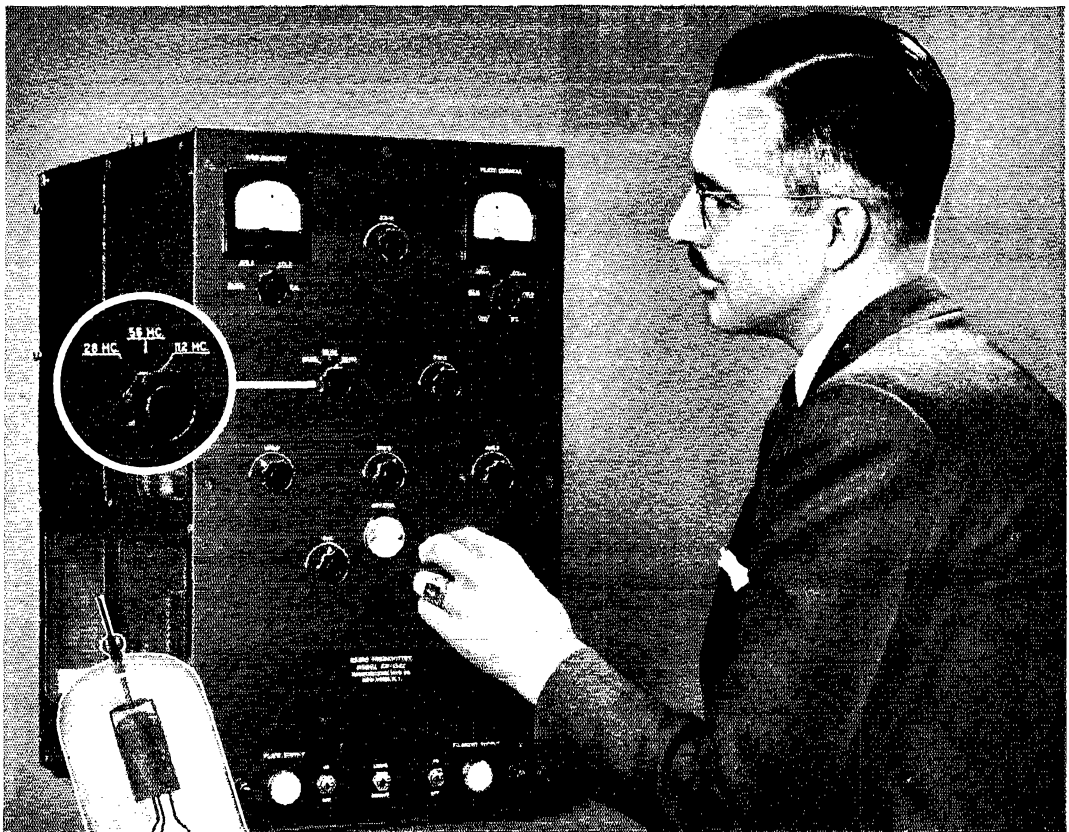
The Sleuth seemed unconvinced. "Let me see," he instructed. Moving forward, he watched Volt's pointer travel up the scale. Slowly he shook his head and stepped back.

"Maybe another Coupling Condenser has gone bad," Ohm suggested meaningly.

At this B.F.O. Tube broke his taciturnity. "Don't you say any of the Parts associated with me have gone bad!" he said threateningly. "I won't stand for it!"

"You're sure that your Coupling Condenser is all right?" Ohm persisted.

"Of course I'm sure. Bad enough to come up here with that micro-phony Detector Tube's lies



James N. Whitaker, chief transmitting engineer of The Hammarlund Mfg. Co., Inc. is shown with the remarkable very high frequency transmitter he recently designed.

FROM 25 TO 125 MEGACYCLES ...without reneutralization

PICTURED above is the new Hammarlund AW-1042; undoubtedly the first neutralized power amplifier to operate on 28, 56, and 112 megacycles without reneutralization.

High stability is not the only news-worthy feature of this new transmitter. It has been engineered with such skill that it replaces an accepted transmitter of similar performance requiring twice the power input and weighing seven times as much!

The AW-1042 produces 50 watts of useful carrier power with either audio or narrow-band frequency modulation, both of which are crystal-controlled. It offers CW, tone telegraph, and phone performance. Hammarlund's AW-1042 eloquently demonstrates the ability of their engineers to evaluate design; and Heintz and Kaufman, Ltd. is proud that HK-24's are used in the final, as well as in the three preceding doubler stages.

States Mr. Whitaker: "I chose HK-24 Gammatrons because their mechanical and electrical characteristics render them particularly suitable for high frequency operation with unusually high efficiency and stability."

HEINTZ AND KAUFMAN, LTD.

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Gammatron Tubes

EFFICIENT VHF OPERATION WITH GAMMATRON HK-24's

The high efficiency of HK-24 Gammatrons at very high frequencies is the result of two things: the long, capped tantalum plate which confines the entire electron stream for useful output, and the fact that the grid is closely spaced to the filament for short electron time-flight.

The HK-24 triode is easy to neutralize, and parasitic oscillation is avoided, because the inter-electrode capacities are low and the grid and plate leads are short. The grid to plate capacity is only 1.7 micro-microfarads.

For maximum and typical ratings of the HK-24 as an r. f. power amplifier, audio amplifier, crystal oscillator, doubler, or tripler, write for data.

(Continued from page 76)

about me, but when you start making dirty cracks about my friends — that's too much!"

Ignoring the outburst, the Sleuth silently gestured to the three Meters and led them slowly down the chassis.

Signal Generator was waiting below to learn the outcome. Downcast, the Sleuth briefly reported the results of the test. Signal Generator listened with unusual intentness.

"How could you let yourself be taken in like that?" he growled disgustedly. "Didn't you know that Detector Tube was stalling? Even if the Signal had been unmodulated — and it wasn't — that still didn't mean anything. Otherwise my artificial signals, which *were* modulated, would have got through."

The Sleuth lifted his head. "You believe Detector Tube is guilty, then?" he asked dully.

"Why, of course. He as good as convicted himself, with that false testimony he gave you. Denying that he knew the Signal was dead in the first place, and then giving you that bum steer on B.F.O. Tube."

"But —"

"Use your head, man. Haven't we eliminated every other possibility? Didn't you investigate all the power and audio stages? Haven't we traced the path of the Signal up through the r.f. and i.f.?"

The Sleuth pondered this. "I guess you're right," he acknowledged.

"It had to be that way. The Signal got through Detector's diode all right, and then through the coupling circuit to his grid. But it never got to Output Tube. It was killed before it left Detector's plate circuit."

The Sleuth drooped despondently again. "Why didn't I think of that?" he asked himself, reproachfully. "I *should* have known. Oscillator Tube as much as told me."

"Oh, well — no lasting harm done," Signal Generator replied sympathetically. "At least we know now who our man is. Now go up there and *get* him — and don't let yourself be played for a sucker again!"

For a moment the Sleuth did not stir. Milly stepped closer and touched his arm. "Come on, chief," she said softly. "It's your duty, you know."

The Sleuth slowly raised his head and Milly smiled at him. Volt grinned his confidence and even Ohm twisted his face into a grimace of encouragement. He pulled himself to his feet and hunched his shoulders at a determined angle.

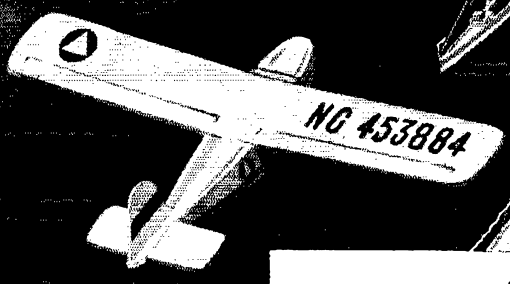
"This is the last time," he announced firmly. "I'm not going up there again. Send a Wire to get a replacement for Detector Tube — immediately," he ordered as he started off.

"That's the stuff, Boss," Ohm applauded. "Hey — what are you going to charge him with?" he called after the departing figure.

The Sleuth stopped short. "I hadn't thought of that," he confessed. "We know he killed the Signal, but there are various degrees of guilt — even for killers."

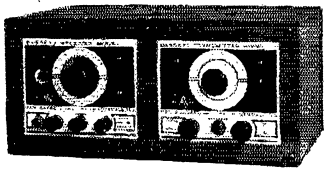
To the men in the sky who patrol our coast line...

Communications are Vital



The men of CAP who patrol our coast line far out over the Atlantic in our 'round-the-clock-fight against the Nazi sub, *rely* upon Bassett aircraft radio equipment for their "communication line" from plane to shore . . . and shore to plane.

Radio equipment is a vital part of the important job these men and their little flying ships are doing. Some day the whole story can be told—in the meantime we are proud to be a part of this big job.



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(Continued from page 78)

"Well," said Signal Generator judicially, "if it was a premeditated killing it would be murder. On the other hand, if it was done on the spur of the moment, like, it might be manslaughter."

"But to prove a murder you've got to have a corpse — and we haven't been able to find the Signal's body," Ohm pointed out sardonically. "From what we know about him he's only a ghost; he never actually existed at all!"

"Nonsense," denied the Sleuth irascibly. "Remember, this is the land of Radio Parts. They have different laws here."

"That's right," Ohm grinned wickedly. "Just what I've been telling you. Here it's Ohm's Law that says how much voltage the juice can have — not Volstead's."

The Sleuth glared at Ohm. "We'll have no more of that, young fellow. This is serious business. Anyway, the Volstead Act has been repealed — and so will you be if you try any more cracks like that."

"Then what are you going to charge him with?" Signal Generator pressed.

"I say it's murder," the Sleuth pronounced with dramatic finality. Striding purposefully, he went back up the chassis again. Detector Tube II was still seated in his socket. He wore an air of apparent unconcern, but underlying it was tensity and trepidation.

"All right," the Sleuth said briefly. "You're under arrest. Come along with me."

Detector Tube colored hotly. "You can't arrest me!" he protested.

Disregarding his expostulations, the Sleuth clamped on the gleaming handcuffs and pulled him roughly out of his socket.

The three Meters and Signal Generator lined up to watch the spectacle. Even Output Meter, hearing the clamor, climbed hastily down the cable pathway and joined them.

"I'm innocent! I'm innocent!" Detector Tube screamed, struggling wildly as the Sleuth dragged him along.

The detective maintained a grim silence until they reached the table land beside the chassis. "All right, then, speak your piece," he ordered.

"You can't do this to me! I didn't murder the Signal."

"You didn't murder the Signal!" the Sleuth repeated scornfully. "Listen —" Point by point he itemized the evidence. Detector Tube subsided into crestfallen silence.

When the recital ended he stood pale and shaking. The smooth black paint of his exterior grew wrinkled; a greyish pallor denoting extreme internal stress came over his baked enamel skin.

"All right," he said finally, almost sobbing. "I'll confess. But it was self defense — B. F. O.

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Tube was beating me so hard I just couldn't stand it any longer!"

"So you killed the Signal, instead of taking it out on Beat Oscillator," Signal Generator sneered. "Self defense — bah! Why don't you plead insanity?"

Detector Tube's staring eyes narrowed to cunning slits. "That's what it was — temporary insanity! Something snapped — my grid, I guess — everything seemed to go black — I don't know what happened then. . . ." His voice trailed off.

"I still say it was murder," the Sleuth repeated inexorably. "You're coming with me. Your replacement is already on his way."

"No — no!" Detector Tube pleaded. "I'm all right now. It won't happen again. Give me another chance!"

The Sleuth stiffened. "Give you a chance to commit another crime, you mean?" he answered with measured scorn. "Never! I'm going to put you away where you'll never be able to harm another Signal."

Jerking the guilt-laden Tube upright, he turned to leave. "The case is finished," he told the waiting group. "You can all go home now."

He walked rapidly away, the discredited Detector Tube stumbling along beside, off into the darkness down the long road from the chassis. They watched him go — Signal Generator with his long arms akimbo, Output Meter standing silently apart, Ohm Meter with a twisted smile on his face, Volt and Milly Am Meter standing side by side with linked arms.

Even as they watched the distant figures disappearing into the shadowy gloom, a sharp click broke the silence with startling abruptness. A low-pitched humming sound was briefly heard, and then a thunderous roar. Pulsating through the room, a giant's voice rolled and vibrated as Loud Speaker blasted the air with all his seismic power. Then an unseen hand turned the knob controlling Volume Control's attenuating arm and the tones became mellow, resonant, powerfully compelling.

Detector Tube's replacement had arrived. A new Signal was traveling the path from Antenna to Output Tube, secure and serene.

The set was at work again.

THE END

QST Visits Camp Hood

(Continued from page 16)

is learned. Students practice tuning and adjustment procedure until these processes become automatic. They learn standardized trouble-shooting routines — how to isolate common faults and make repairs speedily and efficiently.

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And when a student radioelectrician finishes the course he knows those standard TD sets inside and out. On any other type he might be stumped, of course — but that isn't important. What is important is that he does know the gear with which he is to work.

C.W. Operator Training

So much for the radioelectrician training. Turning now to the c.w. operators, again we find a new and different approach. Here the objective is not to make speed demons or even 20 w.p.m. men; the TDs are quite satisfied with an operator who can take only 8 w.p.m. — provided he can make *solid* copy at that speed under any conditions of QRM or the hazards of battle, in a moving vehicle or at night by the light of a dial lamp, under machine-gun fire or with the sound of artillery paralyzing his ear drums.

In the early stages, at least, the code training is orthodox, complying with Signal Corps technique. A battery of Gray tape machines keyed by carefully-recorded hand sending at a 20-w.p.m. character speed supplies practice in 2-word speed intervals from 6 to 16 w.p.m. All practice transmissions are in mixed code groups. Each 20-man code table is supplied a constant speed; individual students progress from one table to the next as they successfully pass the tri-weekly exams.

Each day some 480 students attend the code classes, two hours each day. At the end of the course the average student with no previous experience can take around 10 w.p.m. solid (8 being the minimum acceptable); those with prior knowledge of the code — there are a few in every class — may reach a much higher level, of course. Once a man attains 16 w.p.m. he is automatically advanced to field training.

In the concluding two weeks of the code training class c.w. procedure is taught, much of it by actual operation in the field.

TD operators must learn to send well under any conditions, since most of the sending will be done under battle conditions on a hand key strapped to the operator's leg. This part of the training is carried on under constant instructor supervision. First the students are taught to send dots — evenly-spaced, clean-cut, consecutive dots in series of 30 or more. Then they graduate to Vs and finally to letters and numerals. Throughout the emphasis is on correct character formation rather than speed.

The whole aim is to be able to send *intelligible* code. To this end, in testing sending ability an instructor actually copies down what a student sends, later comparing it with the original copy, rather than merely following the copy while it is being sent. In that way slurred characters cannot be taken for granted.

While c.w. operators are not required to be technicians, they also receive a minimum of 8 hours of preventive maintenance training similar to that given the voice operators, just so they won't attempt to run a rig with a red-hot plate or the meter over against the pin.

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Unit Training

Only the first part of any military training job can be done in the classroom. The remainder ordinarily comes in active service.

In the Tank Destroyers, however, there is an intermediate phase during which classroom teaching is carried on under service conditions. This phase is called Unit Training, and its purpose is training in teamwork — the welding of separately trained specialists into a well-coördinated team. Now receiving increasing application throughout the Army, the principle of unit training was initially established at Camp Hood.

The Advanced Unit Training Center, commanded by Col. Heady, takes a miscellaneous group of newly-trained gunners, drivers, radio operators, pioneers and other specialists, leavens them with a cadre of experienced officers and non-coms, and trains them together first in squads, then as platoons and finally as whole companies — until in the end a completely coördinated battalion emerges.

Unit training is in two categories — basic and advanced. Basic unit training consists of an 8-week period of drill in all phases of military routine. Each prospective TD receives the same training regardless of his specialty. There is no radio training as such during this period.

Advanced unit training is the final phase of the instruction period at Camp Hood, as well as the longest and in some respects the most arduous. For twelve weeks the students spend more of their days out in the field than they do in classroom or shop.

The first six weeks of this period is devoted entirely to field work and outdoor drill. It is in the nature of a general refresher course, with students relearning and applying the varied details of their earlier specialized training. Advanced unit training can be summarized as actual practice in military service.

After the sixth week the communications personnel applies itself exclusively to advanced radio training for a two-week period. Most of this time the students spend back in the classroom, putting the finishing touches on their technical educations.

Then the unit field training resumes. In the tenth week the problems of operation in headquarters units are covered. The final two weeks are devoted to field problems in entire battalions. From this group training emerges the perfected, highly-coördinated, hard-hitting Tank Destroyer battalion.

Actual Service Conditions

The advanced training is so nearly the equivalent of actual service that it can hardly be classed as a substitute.

By this time the technique of operation has become second nature — instinctive, requiring no thought. Operating procedure and technique are only the tools with which a job is being done, the biggest job of all — fighting a war. The tools are important, of course, and so is the technique

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(Continued from page 86)

with which they are used, but they are overshadowed by the military problem itself. The emphasis now is on what is done, not on how to do it.

Such specific radio training as is given in the advanced course is designed to perfect the automatic nature of that performance. It is practice, not instruction. In the case of radioelectricians, for example, it is no longer necessary to plant simulated faults in equipment. Plenty of trouble arises in the field without being planted — real trouble, the same kind that occurs in actual operation, because this is actual operation.

It is this final field unit practice on top of thorough classroom grounding that turns out competent technicians. And they are competent — Capt. H. R. Adamson, in charge of advanced unit radio training, believes that "the best radio-electricians in the world are found in TD battalions."

One apparent exception to the emphasis on field work is in the advanced code training, where the students again sit down at code tables in the classroom. Even here the apparent difference dissolves upon analysis, however, for the training revolves around group intercommunication under battle noise and interference conditions. There'll be two tapes fed into a channel, for example, one at a different pitch or a slightly lower level than the other. The operator is required to copy one signal through the interference from the other. Battle noise records will be fed into the system, as well as other variants corresponding to actual conditions.

The same general variety of realistic training is given voice operators. A notable feature of these classrooms is that there are no signs around reading "Quiet — no noise." Anyone in the room can talk as loudly as he pleases. After all, there are no "Quiet please" signs on a battlefield.

When the twelfth week of advanced training is completed the student has become a proficient, fully-trained soldier, ready to take the field. Usually that is just what he does — without further delay. His battalion will be assigned to a division along with other units — infantry, mechanized cavalry, artillery — which have been receiving similar training elsewhere. Then, a complete striking arm, they go on maneuvers for a final shakedown before being sent overseas.

Aptitude Classification

One reason for the success of TD radio training is the high calibre of the personnel assigned to communications. At the TD classification center only those men heading the lists for aptitude and general intelligence are assigned to radio.

Following initial classification at the replacement center, on his arrival at the TD School the student is given further tests designed to evaluate his operating and mechanical abilities. These tests go several steps further than the customary tests of their type, and their results are further conditioned by detailed progress and aptitude reports by the instructors as a man progresses through the course. By the time a student com-

(Continued from page 88)

pletes his work at the school, not only his scholastic ability but his personal characteristics and potential promise have been evaluated in such detail that he can be assigned to exactly the duty he can best perform.

Even this system is not regarded as the ultimate, however. Camp Hood is conducting an experimental program in this connection, having instituted a personnel classification section manned by experts commissioned from the U. S. Employment Service. These officers are now developing a series of general and specific aptitude tests, including both code and mechanical ability, designed to provide an even more accurate rating of an individual's qualifications than has been possible in the past. There won't be any round pegs in square holes among the TDs in the future if these men can help it — and it's a tribute to the officers in charge of Camp Hood training that they have realized the importance of this problem and taken steps toward its solution.

TD Board

And that about covers our visit to Camp Hood — Replacement Training Center, Radio School and Advanced Unit Training Center — if a single article can cover so vast a project. But there is one more division of Camp Hood to be discussed — the Tank Destroyer Board.

The TD Board is the testing and planning agency of the Tank Destroyers. Its job includes the initiation of tactical doctrines and the development of matériel designed to implement those doctrines, as well as the testing of this matériel, the preparation of training manuals and films and other instructional material, and the setting up of tables of organization, allowances and equipment.

It's a big job, and one capably discharged by the Board and its corps of expert assistants under the able leadership of Col. Raymond T. Montgomery — who, by the way, although a career officer with a long record in the field artillery, confesses to a long-standing interest in radio. An active set-builder in the old days, he describes himself as a "kiver-to-kiver" reader of *QST*.

The man chiefly responsible for the successful application of radio in the TDs is also on the Board — its signal officer, Major Bennett R. Adams, W4EV, formerly Southeastern Division director of ARRL and as competent a dyed-in-the-wool amateur as ever put on a uniform. As signal officer on the Board, acting signal officer for the TD Center and advisor on communications since the TD was first formed, his job it has been to make the original selection of tank destroyer radio equipment, coördinate the issue of equipment, make recommendations to the Signal Corps for the development of new equipment, assign calls and frequencies, coördinate training and procedure, represent the TDs in the setting up of service standards (procedure, installation, etc.), and a few other odd chores. You'd expect the TDs to be wise enough to pick a ham for a job like that — and they got a good one!

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WANTED: Communications Receiver, S20R, 322R, NC80X, NC44, Meissner, or? W6BIL. 430-65th Street, Oakland, Calif.

SELL: Transmitter and parts. Sterling Heil, 725 Folk, Easton, Pa.

TRADE: 10-volume set Hawkins Electrical Guides plus Dictionary for automatic key. Will sell. Kenneth Alley, 816 East Main Street, Marion, Illinois.

WANTED: Meissner Deluxe Signal Shifter Model 9-1058. Frank Huberman, 673 Connecticut Boulevard, East Hartford, Conn.

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WILL SWAP a Supreme Model 589 Tube Tester for a V. J. Voltmeter, or will sell for best offer. Lawless, 27 Sassafrass, Providence, R. I.

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WANTED: 66½ inch Par-Metal enclosed relay rack. Faulkner, 3704 Bowne Street, Flushing, L. I., N. Y.

CANDLER High Speed Telegraph Course wanted. State price. Elmer Krute, Wickersham Co., 111 7th St., San Pedro, Calif.

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WANTED: Original Model Vibroplex. Contacts must be in excellent shape. Sgt. D. C. Alexander, ASN 39827707 SC APO 523 Miami, Fla.

SALE: Mallory Vibrapack VP555. W2NHT.

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WANTED: QSTs 1920 issues and older. ALSO: Riders 4, 5, 7, 8, 9 and 11. Will swap Golden Voice car motorola for any three copies. W9MCX, 1022 N. Rockhill Rd., Rockhill, Mo.

SELL: Commercially built National "600" Phone and CW Transmitter if Par-Metal "De Luxe" Cabinet. NTE-B Exciter and Speech Amplifier, 814 Buffer, PP 100TH'S final. Modulator 810's Class B. 2000 and 1500 volt power supplies. 800 Watts input conservative. Complete including Variac control $675.00. W3F1L, 1012 Wilde Avenue, Drexel Hill, Pa.

WANTED: NC200, SX32, SX28, SX25, Howard 490 or RME99. Cash. Maurice Iversen, 2400 Bay St. Extension, Savannah, Ga.

FOR SALE: Meissner De Luxe Signal Shifter, 1941 Model 9-1058. Used only few hours, $35. F.O.B. Mt. Prospect. Terms Collect on Delivery. W9RLW. Mount Prospect, Illinois.

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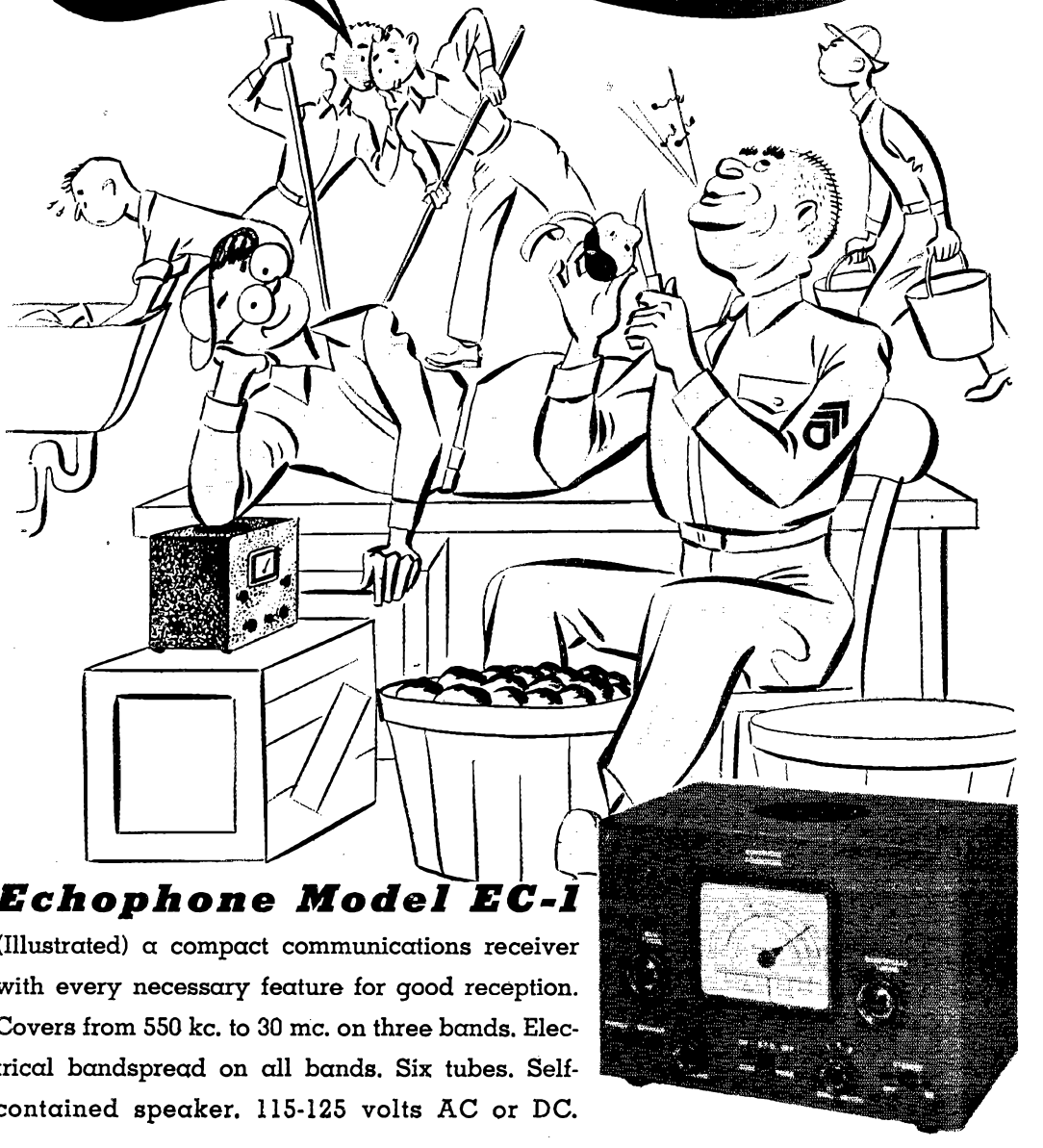

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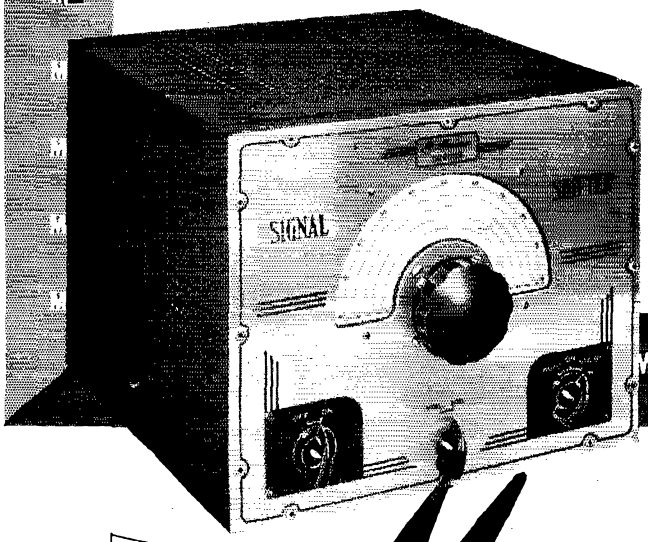

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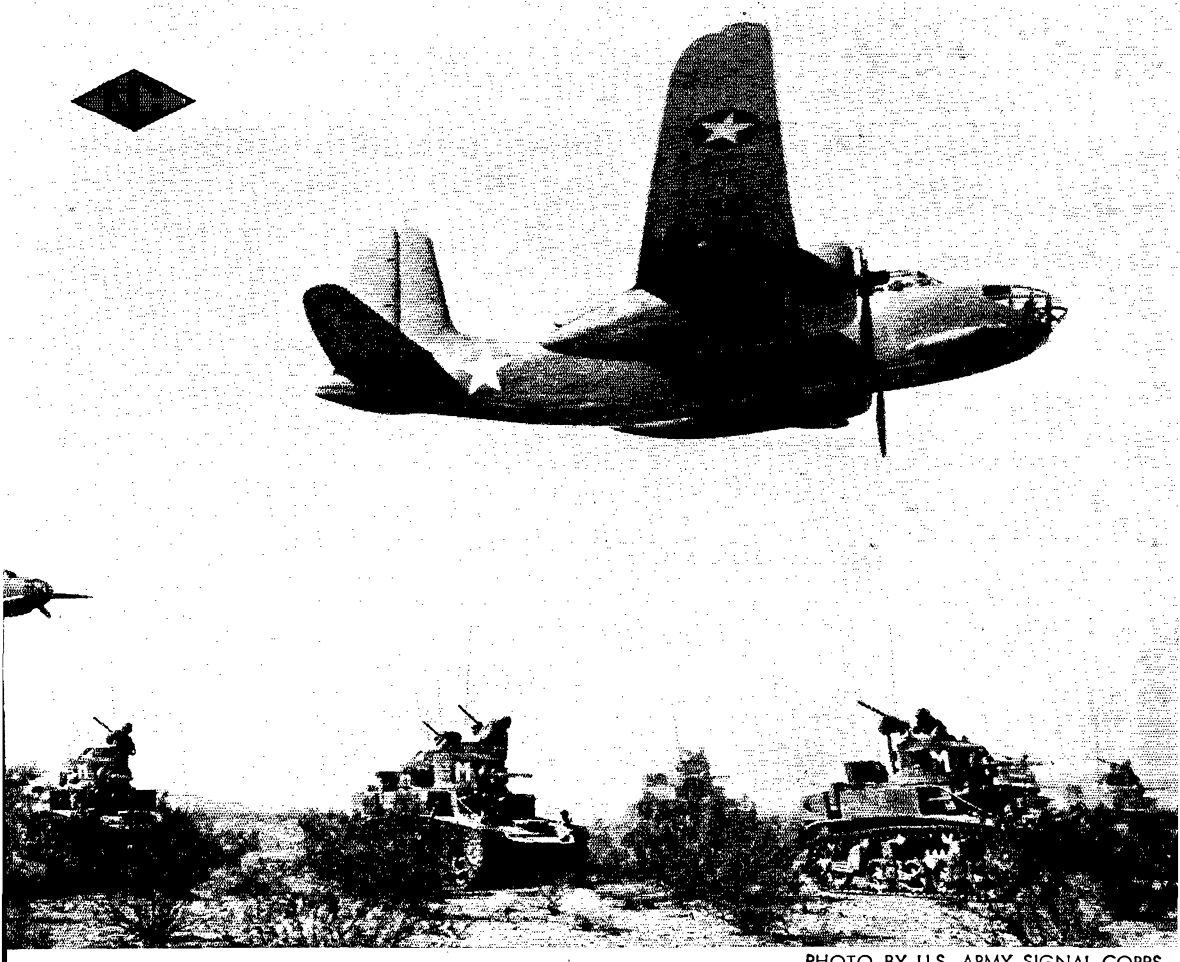

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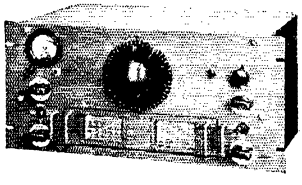
How many sacks of flour does an attack Bomber drop on friendly tanks? How often does a Tank Commander draw a bead on a friendly plane? How long must Air and Armored Forces flex their muscles together in practice before they become welded in a coordinated striking force?

Know-how takes time to acquire. We are thankful that National had years of radio communications know-how all ready.



NATIONAL COMPANY, INC.
MALDEN, MASS., U.S.A.

ON THE JOB...

RCA REBUILT TUBES

A 100% SERVICE!

Service facilities in charge of tube experts have been carefully geared to the task of rebuilding old tubes. Each Rebuilt Tube passes the same rigid tests applied to new RCA Tubes of the same type. To date, it has proved possible to supply rebuilt tubes for 100% of the old tubes returned under the RCA Rebuilt Tube Plan!

RCA REBUILT TUBE PRICES*

RCA-207	RCA-891	RCA-891-R	RCA-892	RCA-892-R
$233.75	$242.25	$298.50**	$242.25	$298.50**

Net Sale Prices F.O.B. Shipping Point, Subject to Change or Withdrawal Without Notice.

*Customer must return an equal quantity of RCA Tubes of similiar types.

**Price after allowance of $50 credit for return of radiator.

From the commercial broadcast station standpoint, "RCA Rebuilts" represent the best news about Transmitting Tubes since war shortages on new tubes first became a threat to continued efficient operation.

Today, thanks to this RCA wartime emergency service to the broadcast profession, an old tube may be "down" but by no means out. If it is one of the five popular types covered by the RCA Rebuilt Tube Plan, it may be exchanged for an RCA Rebuilt Tube of the same type. What's more, these RCA Rebuilt Tubes deliver the watts! Ratings and characteristics are identical with those of new tubes. RCA Rebuilt Tubes carry a new tube guarantee for workmanship and materials. Since they are sold at 85% of the new tube price, service is adjusted on the basis of 85% of our standard adjustment policy.

If your station uses any of the five listed Tube types, we suggest that you write today for full details on the RCA Rebuilt Tube Plan. Like other stations where many RCA Rebuilt Tubes are already in service, you will find it a logical answer to one of your most pressing wartime operations problems.

RCA ELECTRON TUBES

RCA Victor Division, **RADIO CORPORATION OF AMERICA,** Camden, N. J.